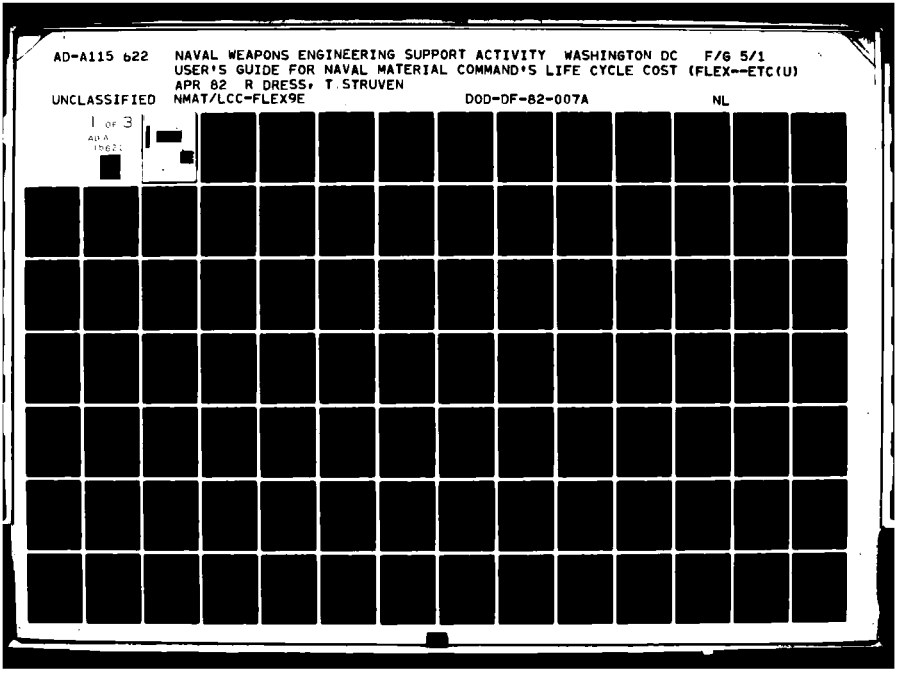
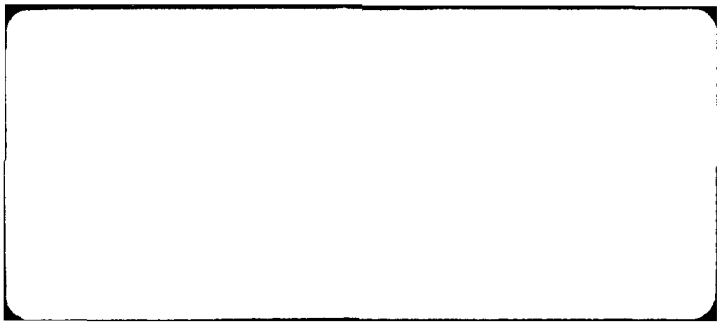
AD-A115 622 NAVAL WEAPONS ENGINEERING SUPPORT ACTIVITY WASHINGTON DC F/G 5/1
USER'S GUIDE FOR NAVAL MATERIAL COMMAND'S LIFE CYCLE COST (FLEX--ETC(U)
APR 82 R DRESS, T STRUVEN
UNCLASSIFIED NMAT/LCC-FLEX9E DOD-DF-82-007A NL





REPORT No: NMAT/LCC-FLEX9E

USER'S GUIDE FOR

NAVAL MATERIAL COMMAND'S

LIFE CYCLE COST (FLEX) MODEL

For futher Information
Please Contact

NMAT-023
NAIR-528
NWESA-31L

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. NMAT/LCC-FLEX9E	2.	3. Recipient's Accession No
4. Title and Subtitle: User's Guide for Naval Material Command's Life Cycle Cost (FLEX) Model			5. Report Date: Prep. 4/82 6.
7. Author(s): R. Dress (ESA) & T. Struven (Hughes Aircraft Co.)			8. Performing Organization Rept. No. NMAT/LCC-FLEX9E
9. Performing Organization Name and Address: Naval Weapons Engineering Support Activity, Washington Navy Yard, Washington D.C. 20374			10. Project/Task/Work Unit No. MAT/ESA/31L 11. Contract(C) or Grant(G) No. (C) N/A (G)
12. Sponsoring Organization Name and Address: Naval Material Command (MAT-023), Washington D.C. 20360			13. Type of Report & Period Covered: INTERIM 14.

15. Supplementary Notes

This methodology has been successfully operated on the following data processing equipment: IBM 360, IBM 370, IBM 3033, IBM 4341, VAX 11-780, PDP 1140, B 6800, MV 8000, UNIVAC, and WANG

16. Abstract (Limit: 200 words)

The FLEX-9E life cycle cost computer model is a user-oriented methodology accommodating most cost structures and their associated equations. It's extreme flexibility allows tailoring to meet requirements of DoD Directives 5000.1, 5000.4, and 5000.28. Also, this methodology has been identified by OMB as having demonstrated successful operation.

This program contains two sample cost structures with equations (one for major weapon systems and one for equipment). These cost structures may be used as-is, modified, or replaced by the user's cost structure. Presented as batch processing, this program can be run from a terminal or modified to run interactively.

17. Document Analysis a. Descriptors

Life Cycle Cost
Life Cycle Cost Analysis
Life Cycle Costing
Economic Analysis

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement: Unlimited	19. Security Class (This Report): UNCLASSIFIED	21. No. of Pages: 258
	20. Security Class (This Page): UNCLASSIFIED	22. Price

(See ANSI-Z39.18) See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

TABLE OF CONTENTS

APPENDICES

FIGURES

TABLES

1.0 INTRODUCTION

The development of life cycle cost (LCC) estimates is a complex process involving the coordination and integration of cost data and schedules generated by various functional organizations such as the program office, systems engineering, manufacturing and support engineering. To support design tradeoff studies, inputs from all program functions must be integrated in a manner which will ensure timely LCC projections. As programs become more complex and the customer more cost conscious, there is a growing need for a standardized and automated LCC estimating tool which can be easily tailored to the nature of individual programs.

This document describes Naval Material Command's Life Cycle Cost (FLEX) Model. FLEX is a computer model designed to project, track and analyze program life cycle costs. Flexibility is the primary characteristic of the FLEX model. This flexibility is reflected in this partial list of model capabilities.

- The model Cost Breakdown Structure (CBS) can be tailored to the Work Breakdown Structure (WBS) of both simple and complex programs.

- The model can use a different cost estimating procedure for each element of the CBS (i.e., algorithm and accounting methods).

- The model uses a common data base to integrate the data generated by the various participating functional organizations. The common data base is used to ensure consistency and continuity in the data shared by the various cost estimating procedures.

- A multiple run feature is available for cost tradeoff analyses. Any element cost estimating procedure or parameter value can be changed from one run to the next. Only the specific changes from the preceding run need be addressed for the following run.

The FLEX model described here is the latest NAVMAT Life Cycle Cost Model (Version 9E). It offers all of the capabilities of the previous versions with additional features designed to enhance its versatility and convenience from the user's standpoint.

A general methodology for performing LCC analysis using FLEX is described in Section 2. Section 3 discusses the data flow, input data, database structure, and the resultant LCC reports involved in using the FLEX Model. Instructions for FLEX users, such as run deck sequence set up and computer program limits, are presented in Section 4.

2.0 METHODOLOGY

2.1 Introduction to FLEX Methodology

The FLEX Model computes the life cycle cost (LCC) of a system by addressing the individual costs of the subsystems or components that comprise the complete system. Relevant costs incurred at each phase of the system life cycle (i.e., development, production, deployment...) are included in the model. This, in effect, creates a LCC profile of the entire system. In addition, FLEX calendarizes the cost estimate and groups related costs into summary elements so that the cost profile of any individual subsystem or group of subsystems can be inspected.

The underlying architecture of the FLEX Model is the Cost Breakdown Structure (CBS) and a set of related cost equations. Costs for each line item in the CBS are computed sequentially, one equation at a time, using the parameter values stored in on-line input files. The input data are easily updated to analyze the effects of alternative scenarios and to support cost trade-off studies. The sample CBS and equations presented in Appendices D and E may be used to compute the LCC of a system, modified, or replaced as necessary to reflect individual program requirements.

2.2 Cost Breakdown Structure

The Cost Breakdown Structure (CBS) is a hierarchical listing of all costs incurred throughout the programmed life cycle. It addresses all of the relevant costs associated with the development, production, and support of a system. Although a different CBS could be selected for each individual case there are certain costs which are common to many systems. Table 2.2-1 presents the sample CBS used for Naval Weapons acquisition programs. The sample CBS is contracted or expanded to accommodate individual program requirements.

Each line in the CBS is identified with a cost or a group of related costs. These individual lines are called "cost elements" and are assigned a six digit CBS number according to their position in the hierarchy.

The life cycle cost can be divided into six or less main categories. These categories are termed "major cost elements" and have CBS numbers of the form X00000, where X stands for a non-zero digit between one and six. In Table 2.2-1, the major cost elements are:

100000 RESEARCH AND DEVELOPMENT
200000 INVESTMENT
300000 OPERATING AND SUPPORT

Each major cost element may be subdivided into a maximum of nine lesser categories. In the example:

100000 Research and Development

TABLE 2.2-1 SAMPLE CDS

E.	FLEX WEAPONS MODEL
000000	TOTAL LIFE CYCLE COST
100000	RESEARCH AND DEVELOPMENT
110000	Validation
111000	Contractor
112000	Government
120000	Full Scale Development
121000	Contractor
121100	Program Management
121200	Engineering
121300	Prototype Hardware
121400	Software
121500	Integration and Test
121600	Documentation
122000	Government
122100	Project Management
122200	Systems Engineering
122300	Systems Test and Evaluation
122310	Test Personnel and Training
122320	Test Spares
122330	Test AGE/GSE/TE
122340	Test Facilities
122400	Foreign Military Sales Benefit
200000	INVESTMENT
210000	Acquisition (Contractor)
211000	Production Hardware
212000	Peculiar Support Equipment
213000	Training
214000	Integration and Test
215000	Program Management
216000	Documentation
217000	Technical Support
218000	Industrial Facilities
219000	Initial Spares and Repair Parts
220000	Government
221000	GFE/GFM
222000	Common Support Equipment
223000	Training
224000	System Test and Evaluation
225000	Project Management
226000	Documentation
227000	Operational/Site Activation
228000	Supply Introduction
229000	Transportation

TABLE 2.2-1 (continued)

300000	OPERATING AND SUPPORT
310000	Operations
311000	Operational Personnel (Crew)
312000	Operational Consumables
312100	Material
312200	POL
312300	Expendable Stores
312400	Utilities
320000	Support
321000	Contractor
321100	Factory Repair
321200	Factory RIW/FFW
321300	Factory Rework/Overhaul
321400	Technical Services
322000	Government
322100	Maintenance Personnel
322200	Support of Support Equipment
322300	Training
322400	Updates & Modifications
322410	Documentation Updates
322420	Software Updates
322430	System/Sub System Modifications
322500	Maintenance Facilities
322600	Supply Support
322610	Replenishment Spares and Repair Parts
322620	Supply Management
322700	Depot Rework/Overhaul
322800	Transportation
322810	Transportation Unscheduled
322820	Transportation Scheduled
330000	Termination

is separated into two categories:

110000	Validation
120000	Full Scale Development

These cost elements may be broken down again. From the example in Table 2.2-1:

110000	Validation

is divided into two categories:

111000	Contractor
112000	Government

This process could continue until there are six separate levels of subdivisions beneath the "Total Life Cycle" level. In most cases, the CBS does not need to be this detailed and the user will not use all levels.

The lowest division cost elements are termed "primary cost elements." Examples of primary cost elements from Table 2.2-1 have CBS numbers of 111000, 112000, 121100, 121200, 121300, 121400, etc. Each primary cost element must be represented by an equation which describes its cost over the life cycle of the system. The user can employ the equations as they exist in the standard file (see Appendices D and E) or create his own. The actual equations are usually relatively simple and easy to understand. For example, a manpower equation may appear as follows:

$$MC = \sum_{I=1}^{Y} NMH(I)*SAL$$

where:

MC = Manpower cost for a certain aspect of the program.

NMH(I) = number of manhours required for reporting period I (manhours).

SAL = Average salary ($/HR).

I = Reporting period designator.

Y = Number of reporting periods in the life cycle (time period).

The actual input and format of the equations is described in section 3.2.3.

2.3 LCC Modeling Criteria

Attention to three basic criteria will ensure that the CBS adequately addresses the costs which are relevant to the objective of the life cycle cost estimating effort.

Completeness - The CBS must include all of the relevant costs incurred during the system's life cycle.

Detail - The CBS should provide sufficient detail for cost traceability and for assessment of the effect of key cost drivers on the total life cycle cost.

Consistency - All cost computations must be based on the same ground rules and assumptions. Special care should be taken to ensure that no more than one primary cost element addresses a specific system, thereby avoiding double accounting of costs.

3.0 FLEX COMPUTER PROGRAM

3.1 FLEX Overview

Nine data files may be used with FLEX, seven input files and two intermediate results files. Figure 3.1-1 presents an overview of the data file interfaces with the FLEX computer program and use of the multi-run feature. Each data file is described briefly and discussed in the sections that follow. Figure 3.1-2 presents an overview of the LCC estimating process, highlighting the data file interfaces and access sequence.

CSDFL data file describes the default CBS. It contains the CBS number and description of each CBS cost element. The cost equation, cost category code, funding type code, and inflation factor code are included for each primary cost element.

DSDFL data file contains the definition or description of each parameter used in the CBS cost equations.

CS data file contains any changes to the default CBS that the user desires to implement for a particular run or group of runs.

NV data file contains the value(s) for each parameter used in the computing the cost equations.

DATA data file contains the information used for FLEX program control, such as the number of reporting periods in the cost estimate. This file also contains the report selection card.

IDENT data file contains the program descriptor uniquely identifying each FLEX run. The descriptor is used as the header on each page of FLEX outputs.

SA data file contains the names of variables that the user has chosen to be sensitized over a specific range.

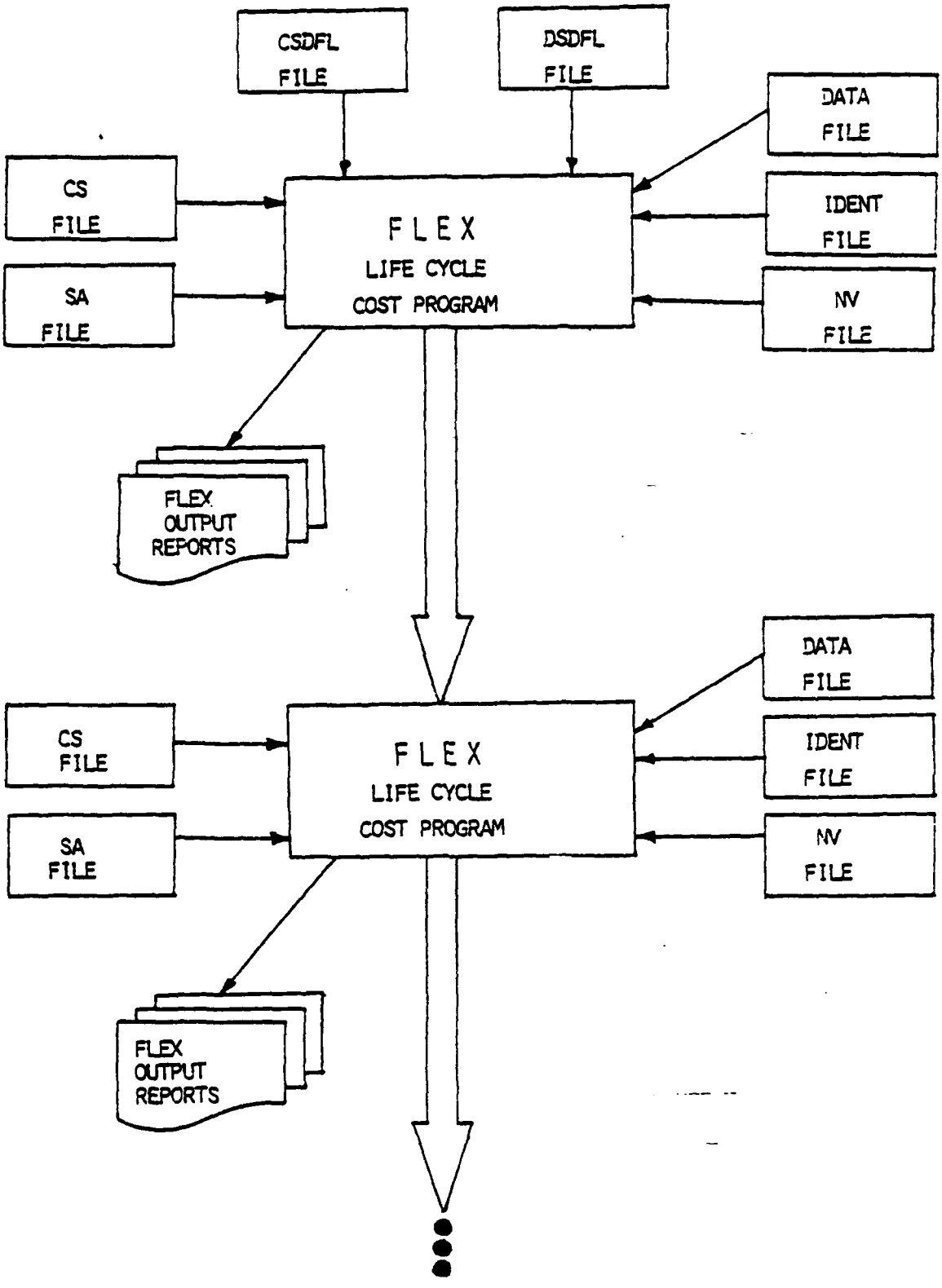
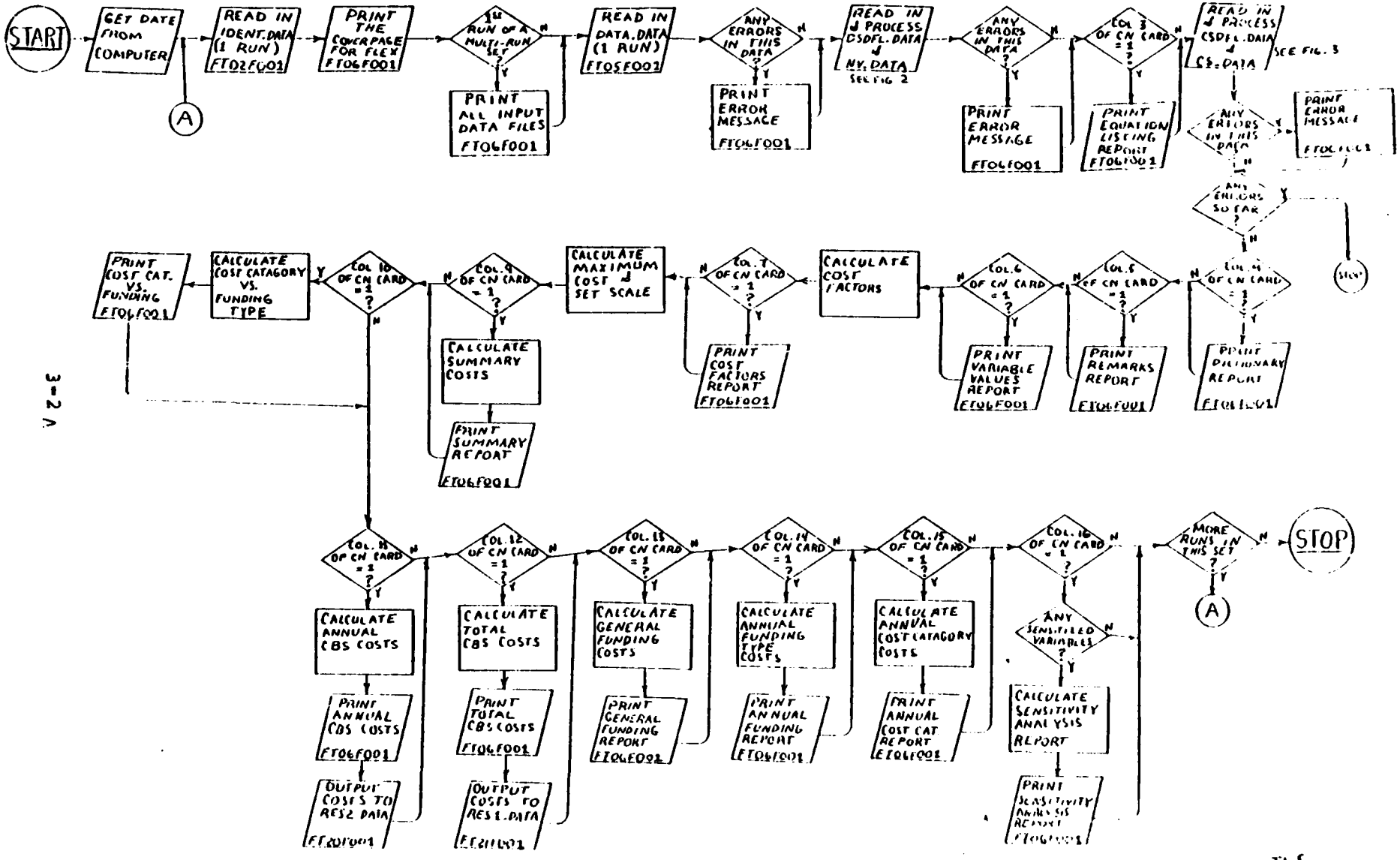


FIGURE 3.1-1 FLEX DATA FILE INTERFACES AND MULTI RUN FEATURE

Figure 3.1-2 Overview of LCC Estimating Process & Data File Interfaces



TI S

3.2 Input Files for the FLEX Program

3.2.1 Introduction

FLEX requires the creation of seven input files. These can be grouped in a partitioned data set or left as stand-alone files depending on the user's particular needs and the JCL file configuration. The following sections give a brief description of each file along with individual card formats and sample input files.

3.2.2 CS_File

The CS file is used for updating CS or EQ cards for each run in a multi-run set. The CS file can contain three types of cards: CS, EQ and ENDCS cards. The following is a description of the card formats and their functions (see Figure 3.2-1.)

CS CARD - This card either deletes a previously entered cost breakdown structure element, or enters an entirely new element.

CS CARD FORMAT

COLUMN	DESCRIPTION
1-2	Card Type "CS"
3-8	Cost Breakdown Structure Number
9-10	Unused
11-50	Cost Element Description
51-54	Unused
55-56	Cost Category
57-59	Unused
60	Funding Type
61-64	Unused
65	Inflation Factor Type
66-69	Unused
70	Equation Code
71-72	Unused
73-78	Deletion Code: "DELETE"
79-80	Unused

- o CS cards may not be continued.
- o All deletion cards must appear first.
- o To delete an already existing element, simply code in columns 1-8 for the element. Leaving the rest of the card blank, type in DELETE in columns 73-78. The deletion of any cost element will automatically delete all of its subdivisions.

Figure 3.2-1 Sample CS File

```
CS100000                                                          DELETE
CS100000  SAMPLE 100000 NAME
CS110000  SAMPLE 110000 NAME                    01   2   4   1
EQ110000  A(I);I,1,Y
CS120000  SAMPLE 120000 NAME                    01   1   3   1
EQ120000  B(I);I,1,Y
CS210000                                                          DELETE
CS340000  THIS LINE IS NEW                      01   1   2   1
EQ340000  C(I);I,1,Y
```

The first line in this example deletes cost element number 100000 and all of its lower indentured cost elements. The next 5 lines recreate CBS number 100000 and also create the CBS numbers 110000 and 120000 with their respective equations. Line 7 deletes CBS number 210000 and any of its sub-elements if they exist. Finally, the last 2 lines create a new CBS number (number (340000) and gives it an equation. The CS file is used primarily for modifying a standard file for a specific run. If the standard file is to be permanantly changed, the user should change the CSDFL file instead.

- To modify an already existing cost element, you must delete it first, then code in the new element as though it did not exist.

- Any primary cost elements must contain a "1" as the equation code and have values for the cost category, funding type, and the inflation factor type, or a fatal error will occur.

- All new CS cards must be in order with respect to their cost breakdown structure number or a fatal error will occur.

EQ CARD - This card must immediately follow any primary cost element. It contains the equation in Reversed Polish Notation which is used to evaluate cost element values for each year.

(NOTE: the EQ card format for the CS file is exactly the same as for the CSDFL file)

EQ CARD FORMAT

COLUMN	DESCRIPTION
1-2	Card Type "EQ"
3-8	Cost Breakdown Structure Number
9-10	Unused
11-80	Cost Equation

- EQ cards may be continued on as many cards as needed with the following restrictions: If a card is to be continued, the last equation element on the card must be followed by a comma. All EQ continuation cards must contain the same characters in columns 1-8 and must be in usage order.

- All EQ cards must be in order with respect to their cost breakdown structure number and must immediately follow the primary cost element CS card, or a fatal error will result.

- To modify the EQ card for a certain CBS number, you must first delete the cost element, and then enter a new CS card.

- All equation elements on EQ cards must be separated by commas. Spaces in this field are ignored.

- For a description of Reversed Polish Notation instructions see section 3.2.3 (the CSDFL file).

ENDCS CARD - This card is used to separate the update sections of the CS file for each individual run of a multi-run set.

COLUMN	DESCRIPTION
1-5	Card Type "ENDCS"
6-80	Unused

- If no updates are to be added to a particular run, the ENDCS card must still be included for the run. (Unless it is the final run, in which case it may be left out.)

3.2.3 CSDEL File

The CSDFL file is the default file of CS and EQ cards for all runs. The CSDFL file can contain only two types of cards. The following is a description of the card formats and the functions (see Figure 3.2-2):

CS CARD - This card describes a cost breakdown structure element. It also contains information as to whether or not it is a primary element. If this is the case, it must contain the cost category, the funding type, the inflation factor type, equation code ("1"), and must be followed by an EQ card.

CS CARD FORMAT

COLUMN	DESCRIPTION
1-2	Card Type "CS"
3-8	Cost Breakdown Structure Number
9-10	Unused
11-50	Cost Element Description
51-54	Unused
55-56	Cost Category Code
57-59	Unused
60	Funding Type Code
61-64	Unused
65	Inflation Factor Type Code
66-69	Unused
70	Equation Code
71-90	Unused

- All CS cards must be in order with respect to their cost breakdown structure number or an error will result.

Figure 3.2-2 Sample CSDFL File

```
CS000000  TOTAL LIFE CYCLE
CS100000  RESEARCH AND DEVELOPMENT
CS110000  VALIDATION
CS111000  CONTRACTOR                                    01   1   1   1
EQ111000  ADC(I);I,1,Y
CS112000  GOVERNMENT                                    01   1   1   1
EQ112000  ADG(I);I,1,Y
CS120000  FULL SCALE DEVELOPMENT
CS121000  CONTRACTOR
CS121100  MANAGEMENT                                    01   1   1   1
EQ121100  DCPM(I);I,1,Y
CS121200  ENGINEERING                                   01   1   1   1
EQ121200  DCE(I);I,1,Y
CS121300  PROTOTYPE HARDWARE                            01   1   1   1
EQ121300  ECH(I);I,1,Y
CS121400  SOFTWARE                                      01   1   1   1
EQ121400  DCS(I);I,1,Y
CS121500  TEST AND EVALUATION                           01   1   1   1
EQ121500  DCTE(I);I,1,Y
CS121600  DOCUMENTATION                                 01   1   1   1
EQ121600  DCD(I);I,1,Y
CS121700  SUPPORT AND TEST EQUIPMENT                    01   1   1   1
EQ121700  DCST(I);I,1,Y
CS122000  GOVERNMENT
CS122100  PROGRAM MANAGEMENT                            01   1   1   1
EQ122100  DGPM(I);I,1,Y
CS122200  PROTOTYPE TEST AND EVALUATION
CS122210  TRAINING                                      01   1   1   1
EQ122210  DGTT(I);I,1,Y
CS122220  TEST SITE ACTIVATION                          01   1   1   1
EQ122220  DGTA(I);I,1,Y
CS122230  TEST AND EVALUATION                           01   1   1   1
EQ122230  DGTE(I);I,1,Y
CS200000  INVESTMENT
    o
    o
    o
```

- Only one CS card per cost element (i.e., CS cards may not be continued).

- Any primary cost element CS cards must contain a "1" as the equation code in column 70 or a fatal error will result. An EQ card immediately follows the CS card for each primary cost element.

EQ CARD - This card must immediately follow any primary cost element. It contains the equation in polish notation which is used to evaluate the cost element value for each year.

EQ CARD FORMAT

COLUMN	DESCRIPTION
1-2	Card Type "EQ"
3-8	Cost Breakdown Structure Number
9-10	Unused
11-80	Cost Equation

- All EQ cards must be in order with respect to their cost breakdown structure-number and must immediately follow the primary cost element CS card, or a fatal error will result.

- EQ cards may be continued on as many cards as needed with the following restrictions: If a card is to be continued, the last equation element on the card must be followed by a comma. All EQ continuation cards must contain the same characters in columns 1-8 and must be in usage order.

- All equation elements on EQ cards must be separated by commas. Spaces in this field are ignored.

Reversed Polish Notation Format

Equations are entered on the EQ cards in the form commonly known as Reversed Polish Notation. It is a form of working with registers and many electronic calculators use this technique. Each operation (+,-,*,/,**,) acts on the two quantities immediately preceding it, working from left to right. Thus A, B, C, +, * represents (B+C)*A.

Equation elements are separated by commas. Summation is indicated by the semicolon. The sequence is "subscript, minimum value, maximum value." The subscript "I" always denotes the year and is treated differently. Those years outside the range of "I" are assigned a cost of zero while those within the range are assigned the cost obtained by fixing the value of "I" appropriately and summing over the other subscripts. Samples of equations written in Reversed Polish Notation are:

1. A(I);I,1,Y

Same as,

$$\sum_{I=1}^{Y} A(I)$$

2. A(I),B,+,C(J),*,D,E,**,-,F,/;I,1,Y,J,1,N

Same as,

$$\sum_{I=1}^{Y} \sum_{J=1}^{N} \{[(A(I) + B) * C(J)] - D^{E}\}/F$$

3.2.4 DATA File

The DATA File controls the input and output reports, allows certain program default parameters to be changed, and allows for a space to write remarks which are printed in the program. The DATA file allows four types of cards which must be grouped in the order presented here. The following is a description of the different card types and their functions (see Figure 3.2-3):

CN CARD - This card controls which input and output reports are printed. It also includes a flag which specifies either inflation rate or inflation factor.

CN CARD FORMAT

COLUMN	DESCRIPTION
1-2	Card Type "CN"
3	Equation Input Report Flag
4	Dictionary Input Report Flag
5	Remarks Input Report Flag
6	Variable Value Input Report Flag
7	Cost Adjustment Factor Input Report Flag
8	Unused

Figure 3.2-3 Sample DATA File

```
CN11111 111111111    0
RM  THIS IS AN EXAMPLE OF THE REMARK CARD.
RM  THERE CAN BE AS MANY REMARKS AS NECESSARY.
 &INPUT
 BY=1,
 CAT1=`DEVELOPM',`ENT FACI',`LITIES  ',
 CAT2=`PROGRAM ',`MANAGEME',`NT      ',
 CATB1=`DEVELOP.',`  ',`FACILITI',`ES',
 CATB2=`PROGRAM ',`  ',`MANAGEME',`NT',
 ELI1=`R & D   ',`         ',
 ELI2=`INVEST. ',`         ',
 FUND6=`       ',`         ',
 IRRD=5*0.05,IRPROC=5*0.06,IRCON=5*0.06,IROM=5*0.08,
 DR=5*0.00,
 Y=5,
 YEARS=`1982',`1983',`1984',`1985',`1986'
 &END
```

9	Summary Output Report Flag
10	Funding vs. Cost Category Output Report Flag
11	Cost Breakdown by Year Output Report Flag
12	Cost Breakdown Totals Output Report Flag
13	General Funding Output Report Flag
14	Annual Cost by Funding Output Report Flag
15	Annual Cost by Cost Categories Output Report Flag
16	Sensitivity Analysis Output Report Flag
17-19	Unused
20	Inflation Rate/Factor Input Flag
21-80	Unused

- The CN card must appear first in the DATA File.

- All input report flags can be either "0" or "1". A "0" signifies that no report is to be included in the output, while a "1" signifies that the report should be printed.

- The output report flag specifies which type or types of output is required. There are three different types: A "1" signifies that the report is in constant dollars, a "2" signifies that the report is in inflated dollars, and a "4" signifies that report is in inflated and discounted dollars. If the user enters "0", no report will be printed. Combinations may be entered by simply adding up the individual report numbers and entering the total (e.g., to print all three of the General Funding output reports, the user should enter a "7" in column 13 of the CN card.) There is a complete description of all reports in the section labeled "Output Reports."

NAMELIST INPUT CARDS - The basic input data is entered on NAMELIST input cards. NAMELIST is a special input processing technique that allows a great deal of freedom and brevity in providing input data to a program.

Certain rules govern the use of the NAMELIST technique; these rules are described here. The first card for NAMELIST input must have "&" in column 2 followed immediately by a NAMELIST name (for this program that name is "INPUT") and the name followed by a blank. Subsequent cards do not use this identification but column 1 must be blank. The end of NAMELIST data signified by entering "&END" after the final model input data. Data is entered in the format "Variable name = Variable value." If the variable is defined as an integer (in this program only dimensioned scalars are

integers), the value must be an integer (not contain a decimal point.) Embedded blanks in the name or value are illegal, but blanks may appear before or after each (CAUTION: Blanks after a value with no decimal point will be interpreted as zeros.) A comma must be used to delimit and separate data entries. Input to arrays may be done in one of several ways. Some of these ways are illustrated in the following example:

Assume an array "A" dimensioned by three, into which it is desired to enter the values 8,8,5. This can be done, under NAMELIST input by:

```
A(1)=8.,A(2)=8.,A(3)=5.,

        or

A=8.,8.,5.,

        or

A=2*8.,5.,

        or

A(1)=8.,A(3)=5.,
```

In the last form, the program will take the first value as default for the second.

RM CARD FORMAT

COLUMN	DESCRIPTION
1-2	Card Type "RM"
3-80	Any standard characters

The RM Cards should immediately follow the CN card.

- A RM card may be continued as long as "RM" is typed in the first columns of the continued card.
- RM cards should be in usage order.

NAMELIST Variables - There is a total of 41 different NAMELIST input variables that can be assigned values in the DATA file. The following is a list and description of each one:

CAT1-CAT10 - These variables contain the names of the various cost categories. There are 10 possible cost categories, with each name comprised of 24 characters or less. Each name must be entered in eight-character groups. For example:

```
CAT1= 'PROGRAM ','MANAGEME','NT      ',
```

If a cost category name is not specified the default values are:

```
CAT1=  CONTRACTOR
CAT2=  PROGRAM MANAGEMENT
CAT3=  TESTING
CAT4=  PRIME EQUIPMENT
CAT5=  TRAINING
CAT6=  SUPPLY SUPPORT
CAT7=  TECHNICAL DATA
CAT8=  SUPPORT EQUIPMENT
CAT9=  OPERATIONS
CAT10= MAINTENANCE
```

NOCAT - This variable contains the number of cost categories presently being used. Its assigned value must be between one and ten. For example:

```
NOCAT= 6,
```

If not included in the NAMELIST input, it is assigned a default value of ten.

CATB1 - CATB10 - These variables contain the names of the various cost categories and should be the same as CAT1, through CAT10, but should be arranged so that the characters are entered on a 20-character field. For example:

```
CATB1= 'PROGRAM ','  ','MANAGEME','NT',
```

If not included in the NAMELIST input, these variables default to the same names as CAT1 - CAT10.

Y - This variable contains the integer number of reporting periods used and must be included in the NAMELIST input. The value should be between one and thirty. For Example:

```
Y=24
```

No default value is given to this variable.

YEARS - The array contains the labels to be given to each of the Y reporting periods. For example:

YEARS= `1980',`1981',`1982', etc.

If not included in the NAMELIST input, the default values are:

YEARS(1)= `1'
YEARS(2)= `2'
o
o
o
o
YEARS(30)= `30'

ELT1 - ELT6 - These variables contain the labels of the major cost elements used in the cost breakdown structure. There are six possible element names with each comprised of sixteen characters or less. Each name must be entered in eight-character groups. For example:

ELT1= `PHASE II',`RDT & E ',

If not included in the NAMELIST input, the default values are:

ELT1= DEVELOPMENT
ELT2= INVESTMENT
ELT3= O & S
ELT4= (no default value given)
ELT5= (no default value given)
ELT6= (no default value given)

FUND1 - FUND6 - These variables contain the funding type labels and can contain sixteen characters or less. Each name must be entered in eight-character groups. For example:

FUND1= `R & D ',` ',

If not included in the NAMELIST input the default values are:

FUND1= R & D
FUND2= PROCUREMENT
FUND3= CONSTRUCTION
FUND4= O & M
FUND5= MIL PERSONNEL
FUND6= OTHERS

BY - This variable contains the integer value of the Y reporting period which is to be used as the base value. For example:

BY=5,

If not included, its default value is one.

DR, IRRD, IRPROC, IRCON, IROM - These arrays contain the real-number values of the rates to be used in calculating cost factors. These values must be entered. For example:

DR=30*0.06,IRRD=30*0.06,IRPROC=30*0.12,
IRCON=0.15,0.10,28*0.06,IROM=30*0.05,

(NOTE: Assumes 30 reporting periods)

DR(Y): Discount rates for the individual reporting periods.

IRRD(Y): Inflation rates for research and development cost for the individual reporting periods.

IRPROC(Y): Inflation rates for procurement costs for the individual reporting periods.

IRCON(Y): Inflation rates for construction costs for the individual reporting periods.

IROM(Y): Inflation rates for operation and maintenance costs for the individual reporting periods.

The inflation rate codes used on the "CS" cards are as follows:

IRRD = "1"
IRPROC = "2"
IRCON = "3"
IROM = "4"

ENDLC CARD - This card is used to separate the individual runs of a multi-run set. It follows immediately after the card containing the NAMELIST &END. It must be included if there is more than one run.

ENDCL CARD FORMAT

COLUMN	DESCRIPTION
1-5	Card Type "ENDLC"
6-80	Unused

3.2.5 DSDFL_File

This file contains the descriptions and values of the parameters used in the primary cost element equations. The DSDFL file can contain two types of cards, the NV and DS cards. The following is a description of the card formats and their functions (see Figure 3.2-4):

NV CARD - This card enters the scalar or array values to be used with the variable names given in the EQ cards of the CSDFL or CS files.

NV CARD FORMAT

COLUMN	DESCRIPTION
1-2	Card Type "NV"
3-4	Unused
5-15	Variable Name
16-80	Variable Value(s)

- The NV card may be continued with the following restrictions: The last variable value on a continued card must be followed by a comma. Columns 1-5 should be exactly the same for each continued card. Continued cards should be in usage order.
- The NV cards describing a variable need not be in any order in the DSDFL file.
- The user need not enter any NV cards in the DSDFL file and instead, enter them separately for each run in the NV file. (As long as there is an NV card for each variable used in the EQ cards for each run.)

DS CARD - This card enters the variable description. It is used only in the output reports and is not required. If left out, no error will result but variable descriptions will be left blank.

DS CARD FORMAT

COLUMN	DESCRIPTION
1-2	Card Type "DS"
3-4	Unused
5-15	Variable Name
16-72	Variable Description
73-80	Unused

Figure 3.2-4 Sample DSDFL File

```
DS   AD(I)        ACQUISITION COST OF DATA DURING INVESTMENT PERIOD
DS   ADC(I)       GOVERNMENTAL PAYMENTS TO THE CONTRACTOR FOR TECHN
DS   ADC(I)       ICHAL WORK PERFORMED DURING VALIDATION PHASE
DS   ADG(I)       GOVERNMENT EXCPENDITURES FOR TECHNICAL AND MANAGO
DS   ADG(I)       RIAL WORK DURING VALIDATION PHASE ($/YEAR)
DS   CSD          AREA COST FOR D-LEVEL MAINTENANCE ($/SQ.FT/YEAR)
DS   CSO          AREA COST FOR OPERATIONAL SPACE ($/SQ.FT./YEAR)
DS   DC(K)        DUTY CYCLE OF THE KTH SPARE ITEM (RATIO)
     o
     o
     o
```

- The DS card may be continued with the following restrictions: Any continuations must be grouped together and in usage order. Any blanks in columns 16-72 are considered characters and will be printed. Only one continuation card can be used.

- Because the NV cards for a certain run need not be included in the DSDFL file and instead entered in the NV file, the DSDFL file can be used exclusively to enter DS cards for a multi-run set. The variable descriptions do not change throughout the set, and the variable values are changed for each individual set.

3.2.6 IDENT File

This file contains the program description used as the heading for each run. In the case of a multi-run set, there must be a header card for each run of the set. There are two types of cards allowed in the IDENT file, the Header card and ENDID card. The following is a description of the card formats and their functions (see Figure 3.2-5):

Header Card - This card enters the description which appears on the top of the page of each output report (the header.) The header can contain up to 100 characters.

HEADER CARD FORMAT

COLUMN	DESCRIPTION
1-120	Characters describing the particular run.

- Any standard characters are allowed
- This card may be continued on one extra card, as long as the limit of 100 characters is not exceeded.

ENDID CARD - This card must immediately follow each header card set. Its function is to separate the headers of each individual run.

ENDID CARD FORMAT

COLUMN	DESCRIPTION
1-5	Card Type "ENDID"
6-80	Unused

Figure 3.2-5 Sample IDENT File

LIFE CYCLE COST EQUIPMENT MODEL FLEX9E TEST RUN

3.2.7 NV File

The NV file is used for updating the values of variables given on the previous NV cards. This allows for new values for each run of a multi-run set. The NV file can contain two types of cards, the NV and ENDNV cards. The following is a description of the card formats and their functions (see figure 3.2-6).

NV CARD - This card either updates the value of a previously entered variable, or defines a completely new variable. The format is exactly the same as in the DSDFL file.

NV CARD FORMAT

COLUMN	DESCRIPTION
1-2	Card Type "NV"
3-4	Unused
5-15	Variable Name
16-80	Variable Value(s)

- The NV card may be continued with the following restrictions: The last variable value on a continued card must be followed by a comma. Columns 1-15 should be exactly the same for each continued card group. Continued cards should be in usage order.
- The NV cards describing a variable need not be in any order in the NV file.
- The user need not enter any NV cards in the DSDFL file and instead, enter them separately for each run in the NV file. (As long as there is an NV card for each variable used in the EQ cards for each run.)

ENDNV CARD - This card is used to separate the update sections of the NV file for each of the individual runs of a multi-run set.

If no updates are to be added to a particular run, an ENDNV card must still be included for that run. (Unless it is the final run, in which case, it may be left out.)

ENDNV CARD FORMAT

COLUMN	DESCRIPTION
1-5	Card Type "ENDNV"
6-80	Unused

Figure 3.2-6 Sample NV File

```
NV   NK          15.
NV   NM          2.
NV   AD(Y)       300000,4*0.0
NV   ADC(Y)      500000,4*0.0
NV   ADG(Y)      250000,4*0.0
NV   ATU(Y)      50000,4*0.0
NV   CE          2.
NV   CIPE        1500.
NV   CM          .50
NV   CP          .05
NV   CS(Y)       2*0.,3*15000.
NV   CSD         2.4
NV   CSI         240.
NV   CSO         240.
NV   CST(NK)     750.,10000.,20000.,100000.,30000.,400000.,50000.,
NV   CST(NK)     10000.,20000.,500.,5*0.00
NV   CTI         1000.
NV   CTM         750.
NV   CTO         500.
     o
     o
     o
```

3.2.8 SA_File

This file identifies the variables that will be sensitized in each run. A scalar so marked, will be set equal to the lower range value. The model calculations will be performed and output will be printed, and the scalar value will increase by 1/10 of the range. This process will continue until after the scalar value equals the upper range value (see Figure 3.2-7.)

An array variable so identified has all elements multiplied by the lower range value. The program then performs all calculations. This process is repeated ten times incrementing the multiplier by 1/10 of the range each time. Array elements are subsequently printed giving the original and eleven modified values of each element.

There is a limit of ten scalars and ten array variables that can be sensitized in each run. Any excess will be ignored and a warning message will be printed. It should be noted here that the sensitivity analysis procedure can be very expensive if large data-bases are used and should be implemented with discretion.

There are two types of cards allowed in the SA file, the SA card and the ENDSA card. The following is a description of the card formats and their functions:

SA CARD - This card identifies the variables that will be sensitized for each individual run. It also allows the user to set the lower and upper range values.

SA CARD FORMAT

COLUMN	DESCRIPTION
1-2	Card Type "SA"
3-9	Unused
10-17	Variable Mnemonic
18-19	Unused
20-29	Lower Range Limit
30-39	Upper Range Limit
40-80	Unused

Figure 3.2-7 Sample SA File

```
SA      CIPE    750     2250
SA      CTI     500     1500
SA      DCD     0.500   1.500
SA      ADC     0.250   1.250
```

The first two variables specified, CIPE and CTI, are scalers while the next two, DCD and ADC, are arrays.

ENDSA CARD - This card must immediately follow the SA cards used for each run of a multi-run set.

ENDSA CARD FORMAT

COLUMN	DESCRIPTION
1-5	Card Type "ENDSA"
6-80	Unused

3.3 Output Reports for the FLEX Program

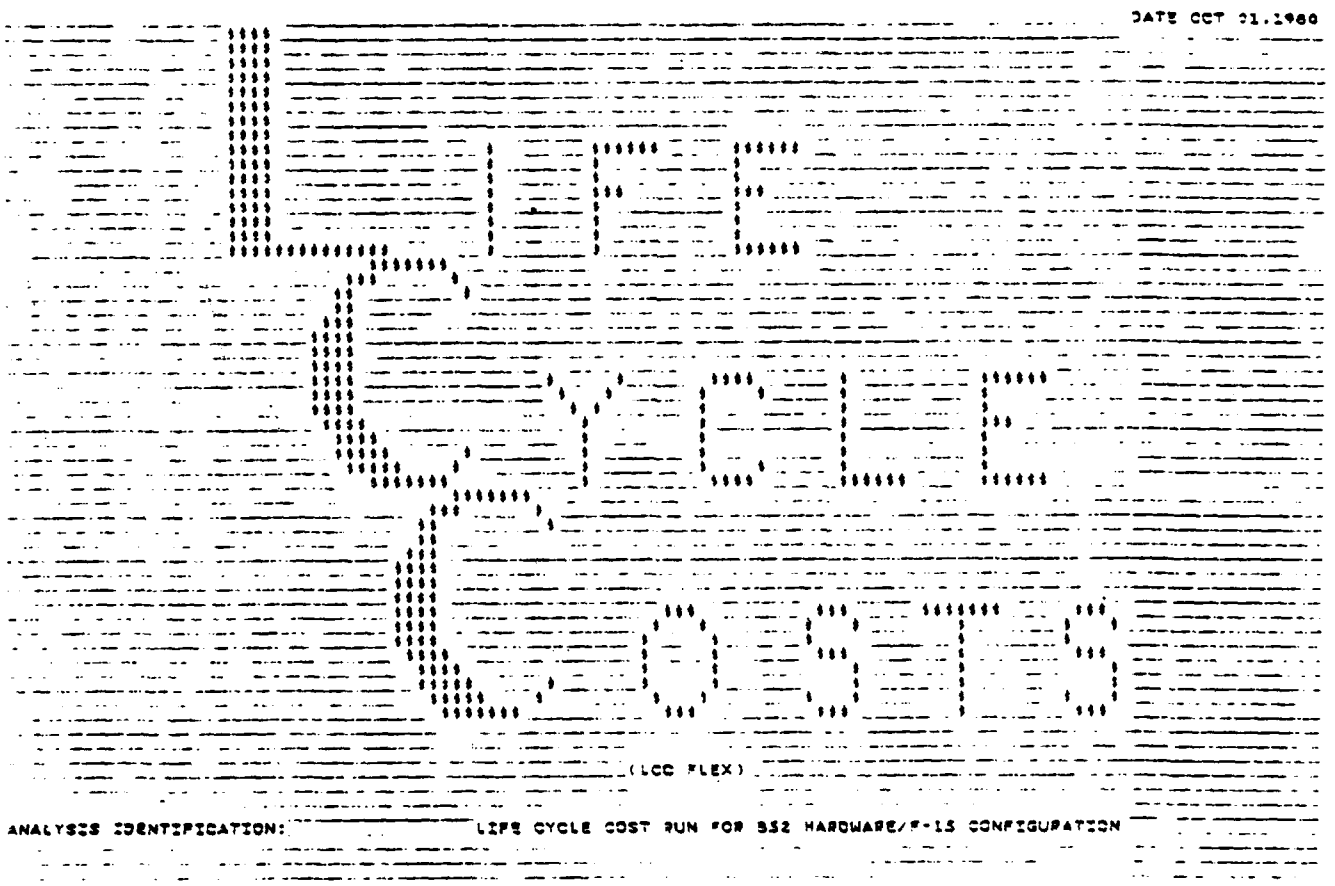
3.3.1 Introduction

FLEX makes available a large number of output reports that the user can choose to print. A brief description and a sample of each type of report follows this section. Output reports for multiple-run sets are also discussed. All reports are chosen through the use of the CN Card in the DATA File. Please refer to section 3.2.5 for a complete description of CN card format. Also refer to Appendix G For Cognizant Office output reports.

3.3.2 Title Page and Input Data Listing

The title page is printed out for every run (this includes multiple-run sets). Besides the title, the date is printed in the upper right hand corner and the program identification for the specific run is printed at the bottom. The title page is always printed and is not under user control.

Immediately after the title page, the Input Data Listing is printed. This is basically a direct output of the input files. Errors in the input files (if any exist) are also listed here with an error message and the program is terminated. This listing is only printed once for each multi-run set, and it is also not under user control.



INPUT DATA LISTING AND ERROR DIAGNOSTICS

NV MODIFICATIONS

```
NV  NK          113.                                                                    172
NV  NM          1.                                                                      173
NV  AD(Y)       0.2*298266,10*0.                                                        174
NV  ADC(Y)      15000000.12*0.                                                          175
NV  ATU(Y)      13*0.0                                                                  176
NV  CCONV       1.0                                                                     177
NV  CE          0.0                                                                     178
NV  CIPE        0.0                                                                     179
NV  CM          0.0                                                                     180
NV  CP          .05                                                                     181
NV  CS(Y)       13*0.0                                                                  182
NV  CSD         3.97                                                                    183
NV  CSI         3.97                                                                    184
NV  CSO         3.97                                                                    185
NV  CST(NK)     67000,6495,2122,4968,33517,8266,247400,6665,3238,10940.                 186
NV  CST(NK)     55000,4433,2600,512,25537,14000,2590,2000,3251,5933,                    187
NV  CST(NK)     22491,103900,4750,4824,10143,23755,21000,271200,136932.                 188
NV  CST(NK)     136932,3050,2319,959,942,7461,5766,4000,492,9345,2934,                  189
NV  CST(NK)     1625,13360,2670,915,175600,4886,15995,26754,17384,18490.                190
NV  CST(NK)     21356,10812,8113,229800,2617,9991,4040,5088,7780,5085.                  191
NV  CST(NK)     2972,6000,2773,3759,2908,3579,16988,9671,2393,2*3669,                   192
NV  CST(NK)     2580,6016,8720,750,4360,4910,221000,7760,8245,4320,7176,                193
NV  CST(NK)     12300,6704,8636,5896,11915,7394,6460,1105,6140,9793,6980,               194
NV  CST(NK)     6830,2995,10900,1805,127300,12265,10139,15981,10178,                    195
NV  CST(NK)     10869,17000,876,1796,314,239,2668,130,218,240,5216                      196
NV  CTI         20578.                                                                  197
NV  CTM         19559.                                                                  198
NV  CTO         0.0                                                                     199
NV  CTP         8936.                                                                   200
```

INPUT DATA LISTING AND ERROR DIAGNOSTICS

NAMELIST DATA

```
CN01011011111111    0                                                    293
RM      LCC SENARIO AND ASSUMPTIONS.                                     294
RM                                                                       295
RM                                                                       296
RM   ..DATA SOURCES                                                      297
RM      QUATERLY UPDATE OF MTBD'S DATED 16 SEPTEMBER 1980                298
RM      PREDICTED MTBD VALUES FOR                                        299
RM        RADAR SIGNAL DIGITAL PROCESSOR - DATED 14 NOVEMBER 1979        300
RM      F-15 RADAR PROGRAM CONFIGURATION CHARTS - 31 JANUARY 1979
```

INPUT DATA LISTING AND ERROR DIAGNOSTICS

NAMELIST DATA

```
RM     OPTIMUM REPAIR LEVEL ANALYSIS,L-34, - DATED 26 OCTOBER 1979                    301
RM     OPTIMUM REPAIR LEVEL ANALYSIS,L-34, - DATED 15 JULY 1973(I)                    302
RM     SUPER SUMMARY BY PART NO..REPORT 84325-72 - DATED 19 SEPTEMBER 80              303
RM                                                                                    304
RM  ..PRODUCTION AND INVENTORY BASED ON 96 SETS THRU FY83 BUY                         305
RM     R&D          : 1 YEARS                                                         306
RM     PROD         : 2 YEARS                                                         307
RM     OPERATION    :11 YEARS (10 YEAR EQUIP LIFE CYCLE PERIOD)                       308
RM                                                                                    309
RM     YEARS        82 83 84 85 86 87 89 90 91 92 93                                  310
RM     PROD SETS    72 24                                                             311
RM     CUM SETS     72 96 96 96 96 96 96 96 96 96 24                                  312
RM     SITE ACT     12  4                                                             313
RM                                                                                    314
RM  ..DEPLOYMENT                                                                      315
RM     16 BASES (CONUS)                                                               316
RM      6 SYSTEMS/BASE                                                                317
RM                                                                                    318
RM  ..AIRCRAFT UTILIZATION                                                            319
RM     30 PER MONTH                                                                   320
RM     1.2 FH TO OH RATIO                                                             321
RM                                                                                    322
RM  ..2 LEVEL MAINTENANCE CONCEPT                                                     323
RM                                                                                    324
RM  ..MAINTENANCE PERSONNEL PER SITE                                                  325
RM     'O' LEVEL = 5                                                                  326
RM     'D' LEVEL = 4                                                                  327
RM    NO OPERATIONS (PILOTS) CONSIDERED                                               328
RM                                                                                    329
RM  ..TOTAL LRU/SRU ENTRIES:113(10 LRU'S)                                             330
RM                                                                                    331
RM  ..GSE BASED ON RFAT& PROGRAM                                                      332
RM     2 UNITS PER DEPOT                                                              333
RM     1 UNIT TRAINING AND SPECIAL TEST SITE                                          334
RM                                                                                    335
RM                                                                                    336
 &INPUT                                                                               337
       BY=1,     Y=13,                                                               338
 IRRD=13*1.0,  IRPROC=13*1.0,  IRCON=13*1.0,  IROM=13*1.0,  OR=13*1.0,                339
 YEARS='__81','__82','__83','__84','__85','__86','__87','__88','__89',               340
       '__90','__91','__92','__93',                                                   341
 &END                                                                                 342
```

*** INPUT STATISTICS ***
342 CARDS READ
0 ERRORS
STATISTICS 3 SYSTEM SCALARS 42 USER SCALARS 43 ARRAYS 1023 ARRAY ELEMENTS
70 COST BREAKDOWN STRUCTURE ELEMENTS
650 EQUATION ELEMENTS

3.3.3 Remarks_Report

This report contains the remarks for each specific run entered by the RM cards in the DATA file (see section 3.2.4.)

```
DATE OCT 01,1980        LIFE CYCLE COST RUN FOR B52 HARDWARE/F-15 CONFIGURATION        PAGE  3.001

                                        REMARKS

   LCC SENARIO AND ASSUMPTIONS.

..DATA SOURCES
   QUATERLY UPDATE OF MTBD'S DATED 16 SEPTEMBER 1980
   PREDICTED MTBD VALUES FOR
     RADAR SIGNAL DIGITAL PROCESSOR - DATED 14 NOVEMBER 1979
   F-15 RADAR PROGRAM CONFIGURATION CHARTS - 31 JANUARY 1979
   OPTIMUM REPAIR LEVEL ANALYSIS,L-34, - DATED 26 OCTOBER 1979
   OPTIMUM REPAIR LEVEL ANALYSIS,L-34, - DATED 15 JULY 1973(Z)
   SUPER SUMMARY BY PART NO.,REPORT 84325-72 - DATED 19 SEPTEMBER 80

..PRODUCTION AND INVENTORY BASED ON 96 SETS THRU FY83.BUY
   R&D         : 1 YEARS
   PROD        : 2 YEARS
   OPERATION   :11 YEARS (10 YEAR EQUIP LIFE CYCLE PERIOD)

   YEARS       82 83 84 85 86 87 89 90 91 92 93
   PROD SETS   72 24
   CUM SETS    72 96 96 96 96 96 96 96 96 96 24
   SITE ACT     5  1

..DEPLOYMENT
   4 BASES (CONUS)
   16 SYSTEMS/BASE

..AIRCRAFT UTILIZATION
   30 PER MONTH
   1.2 FH TO OH RATIO

..2 LEVEL MAINTENANCE CONCEPT

..MAINTENANCE PERSONNEL PER SITE
   'O' LEVEL = 6
   'D' LEVEL = 4
  NO OPERATIONS (PILOTS) CONSIDERED

..TOTAL LRU/SRU ENTRIES:113(10 LRU'S)

..GSE BASED ON RFATS PROGRAM
   2 UNITS PER DEPOT
   1 UNIT TRAINING AND SPECIAL TEST SITE
```

3.3.4 Dictionary

The Dictionary gives a listing of all variables along with their values and definitions. The output is sub-divided into a scalar listing and an array listing. The variable values listed are those that are assigned for the particular run and may be updated if the user is executing a multiple run set.

```
DATE OCT 01,1980          LIFE CYCLE COST RUN FOR B52 HARDWARE/F-15 CONFIGURATION                    PAGE  4.003
                                    * * * INPUT DATA - SCALARS * * *
NAME                                        DESCRIPTION
PSOS          FLOOR SPACE REQUIRED FOR THE OPERATION OF A PRIME EQUIPMENT  ( SQ. FT./EQUIP. )
        0.00
RAM           OPERATOR AND O/I LEVEL MAINTENANCE PERSONNEL ATTRITION RATE  ( RATIO )
        0.45
RAP           DEPOT LEVEL MAINTENANCE PERSONNEL ATTRITION RATE  ( RATIO )
        0.14
RDM           TECHNICAL DATA MANAGEMENT COST FOR FILE MAINTENANCE  ( $/PAGE/YEAR )
       85.00
RIE           AVERAGE NATIONAL STOCK NUMBER (NSN) ENTRY COST INTO THE SUPPLY SYSTEM  ( $/NSN )
      550.55
```

```
DATE OCT 01,1980          LIFE CYCLE COST RUN FOR B52 HARDWARE/F-15 CONFIGURATION                    PAGE  4.004
                                    * * * INPUT DATA - ARRAYS * * *
NAME                                        DESCRIPTION
DR      ( 13)   ANNUAL DISCOUNT RATE FOR FUTURE COSTS  ( RATIO )
          1.00          1.00          1.00          1.00          1.00          1.00          1.00          1.00          1.00          1.00
          1.00          1.00          1.00
IRRD    ( 13)   ANNUAL INFLATION RATE FOR FUTURE COSTS OF R&D TYPE OF FUNDING  ( RATIO )
          1.00          1.00          1.00          1.00          1.00          1.00          1.00          1.00          1.00          1.00
          1.00          1.00          1.90
IRPROC  ( 13)   ANNUAL INFLATION RATE FOR FUTURE COSTS OF PROCUREMENT TYPE OF FUNDING  ( RATIO )
          1.00          1.00          1.00          1.00          1.00          1.00          1.00          1.00          1.00          1.00
          1.00          1.00          1.00
IRCON   ( 13)   ANNUAL INFLATION RATE FOR FUTURE COSTS FOR CONSTRUCTION TYPE OF FUNDING  ( RATIO )
          1.00          1.00          1.00          1.00          1.00          1.00          1.00          1.00          1.00          1.00
          1.00          1.00          1.00
IROM    ( 13)   ANNUAL INFLATION RATE FOR FUTURE COSTS OF O&M TYPE OF FUNDING  ( RATIO )
          1.00          1.00          1.00          1.00          1.00          1.00          1.00          1.00          1.00          1.00
          1.00          1.00          1.00
AD      ( 13)   ACQUISITION COST OF DATA DURING INVESTMENT PERIOD  ( $/YEAR )
          0.00    295,266.00    298,266.00          0.00          0.00          0.00          0.00          0.00          0.00          0.00
          0.00          0.00          0.00
ADC     ( 13)   GOVERNMENT PAYMENTS TO THE CONTRACTOR FOR TECHNICAL AND MANAGERIAL WORK PERFORMED DURING VALIDATION PHASE ($/YEAR)
 15,000,000.00          0.00          0.00          0.00          0.00          0.00          0.00          0.00          0.00          0.00
          0.00          0.00          0.00
ATU     ( 13)   ACQUISITION, TRANSPORTATION, AND INSTALLATION COSTS OF TRAINING AIDS AND DEVICES DURING INITIAL TRAINING  ($/YEAR)
          0.00          0.00          0.00          0.00          0.00          0.00          0.00          0.00          0.00          0.00
          0.00          0.00          0.00
CS      ( 13)   SOFTWARE MAINTENANCE COST DURING PRIME EQUIPMENT OPERATION  ( $/YEAR )
          0.00          0.00          0.00          0.00          0.00          0.00          0.00          0.00          0.00          0.00
          0.00          0.00          0.00
CST     (113)   UNIT COST OF THE KTH SPARE/REPAIR ITEM  ( $/ITEM )
     87,000.00      6,495.00      2,122.00      4,968.00     33,517.00      8,266.00    247,400.00      6,665.00      3,235.00     10,940.00
     55,000.00      4,433.00      2,600.00        512.00     25,537.00     14,000.00      2,590.00      2,000.00      5,251.00      5,933.00
     22,491.00    103,900.00      4,750.00      4,824.00     10,143.00     23,755.00     21,000.00    271,200.00    156,932.00    156,932.00
      3,050.00      2,519.00        958.00        942.00      7,461.00      5,766.00      4,000.00        492.00      9,345.00      2,934.00
      1,625.00     13,560.00      2,670.00        915.00    175,600.00      4,886.00     15,995.00     26,754.00     17,384.00     18,490.00
     21,356.00     10,812.00      8,113.00    229,800.00      2,617.00      9,991.00      4,040.00      5,068.00      7,780.00      5,088.00
      2,972.00      6,000.00      2,773.00      3,759.00      2,908.00      3,579.00     16,958.00      9,671.00      2,393.00      3,669.00
      3,569.00      2,530.00      6,016.00      8,720.00        750.00      4,360.00      4,910.00    221,000.00      7,760.00      8,245.00
      4 320.00      7,176.00     12,300.00      6,704.00      8,656.00      5 496.00     11,915.00      7,394.00      6,460.00      1,105.00
          0.00      9,793.00      6,930.00      6,830.00      2,995.00      1   0.00      1,205.00    127,300.00     12,265.00     10,159.00
          1.00     10,179.00     10,359.00     17,000.00        876.00          00        314.00          00       ,668.00          .00
         15.0             0        216.

*    * *      * *    * *    * * *    * *    D AR    ALUE    M IE    ) OTC    * *    * *    * *    * *    *    .
```

3.3.5 Cost_Adjustment_Factors_Report

This is a listing of the Inflation and Discount Factors calculated from the inflation and discount rates entered in the NAMELIST variables DR, IRRD, IRPROC, IRCON, and IROM, in conjunction with the flag in column 20 of the CN card. (See section 3.2.4 entitled "DATA File".) If a value of 0.00 is entered for each, each cost adjustment factor will be 1.00 and inflated and discounted dollar costs will be the same as constant dollar costs (see section 3.3.13.)

DATE OCT 01,1980 LIFE CYCLE COST RUN FOR B52 HARDWARE/F-15 CONFIGURATION PAGE 5.001

COST ADJUSTMENT FACTORS

YEAR	INFLATION FACTORS				INFLATION AND DISCOUNT FACTORS				DISCOUNT FACTORS
	R & D	PROCUREMENT	CONSTRUCTION	O & M	R & D	PROCUREMENT	CONSTRUCTION	O & M	
81	2.000	2.000	2.000	2.000	1.000	1.000	1.000	1.000	0.500
82	4.000	4.000	4.000	4.000	1.000	1.000	1.000	1.000	0.250
83	8.000	8.000	8.000	8.000	1.000	1.000	1.000	1.000	0.125
84	16.000	16.000	16.000	16.000	1.000	1.000	1.000	1.000	0.063
85	32.000	32.000	32.000	32.000	1.000	1.000	1.000	1.000	0.031
86	64.000	64.000	64.000	64.000	1.000	1.000	1.000	1.000	0.016
87	128.000	128.000	128.000	128.000	1.000	1.000	1.000	1.000	0.008
88	256.000	256.000	256.000	256.000	1.000	1.000	1.000	1.000	0.004
89	512.000	512.000	512.000	512.000	1.000	1.000	1.000	1.000	0.002
90	1024.000	1024.000	1024.000	1024.000	1.000	1.000	1.000	1.000	0.001
91	2049.000	2049.000	2049.000	2049.000	1.000	1.000	1.000	1.000	0.0
92	4096.000	4096.000	4096.000	4096.000	1.000	1.000	1.000	1.000	0.0
93	8192.000	8192.000	8192.000	8192.000	1.000	1.000	1.000	1.000	0.0

********** MILITARY PERSONNEL FUNDING USES THE SAME COST ADJUSTMENT FACTORS AS O&M **********

3.3.6 Summary Table (Cost Category vs. Major Cost Element)

The Summary lists the cost category costs per major cost elements for the total life cycle. The individual costs are also given as percentages of both the cost category totals and the major cost element totals.

DATE OCT 01,1980 LIFE CYCLE COST RUN FOR B52 HARDWARE/F-15 CONFIGURATION PAGE 6.001

SUMMARY

$$$ COSTS IN THOUSAND DOLLARS $$$ BASE YEAR= 81 ,CONSTANT DOLLARS

COST CATEGORY	COST ELEMENT: DEVELOPMENT	INVESTMENT	O&S	COST CATEGORY TOTAL
CONTRACTOR	15,000	0	0	15,000
% OF COST CATEGORY TOTAL	100.0	0.0	0.0	100.0
% OF COST ELEMENT TOTAL	100.0	0.0	0.0	4.7
PROGRAM MANAGEMENT	0	0	0	0
% OF COST CATEGORY TOTAL	0.0	0.0	0.0	100.0
% OF COST ELEMENT TOTAL	0.0	0.0	0.0	0.0
TESTING	0	0	0	0
% OF COST CATEGORY TOTAL	0.0	0.0	0.0	100.0
% OF COST ELEMENT TOTAL	0.0	0.0	0.0	0.0
PRIME EQUIPMENT	0	80,164	0	80,164
% OF COST CATEGORY TOTAL	0.0	100.0	0.0	100.0
% OF COST ELEMENT TOTAL	0.0	37.1	0.0	25.2
TRAINING	0	1,662	7,805	9,467
% OF COST CATEGORY TOTAL	0.0	17.6	82.4	100.0
% OF COST ELEMENT TOTAL	0.0	0.8	9.0	3.0
SUPPLY SUPPORT	0	131,357	6,046	137,403
% OF COST CATEGORY TOTAL	0.0	95.6	4.4	100.0
% OF COST ELEMENT TOTAL	0.0	60.8	7.0	43.2
TECHNICAL DATA	0	605	1,384	1,989
% OF COST CATEGORY TOTAL	0.0	30.4	69.6	100.0
% OF COST ELEMENT TOTAL	0.0	0.3	1.6	0.6
SUPPORT EQUIPMENT	0	2,225	0	2,225
% OF COST CATEGORY TOTAL	0.0	100.0	0.0	100.0
% OF COST ELEMENT TOTAL	0.0	1.0	0.0	0.7
OPERATION	0	0	0	0
% OF COST CATEGORY TOTAL	0.0	0.0	0.0	100.0
% OF COST ELEMENT TOTAL	0.0	0.0	0.0	0.0
MAINTENANCE	0	0	71,529	71,529
% OF COST CATEGORY TOTAL	0.0	0.0	100.0	100.0
% OF COST ELEMENT TOTAL	0.0	0.0	82.4	22.5
COST ELEMENT TOTAL	15,000	216,012	86,764	317,776
% OF LIFE CYCLE COST	4.7	68.0	27.3	100.0

3.3.1 Funding_Type_vs__Cost_Category_Table

This table lists the Cost Category costs per Funding Type of the total life cycle. The individual costs are also given as percentages of both the cost category totals and the funding type totals.

DATE OCT 01,1980 LIFE CYCLE COST RUN FOR B52 HARDWARE/F-15 CONFIGURATION PAGE 7.001

FUNDING VS. COST CATEGORY

$$$ COSTS IN THOUSAND DOLLARS $$$ %%%%%%BASE YEAR=__81 ,CONSTANT DOLLARS%%%%%%

COST CATEGORY	FUNDING TYPE R & D	PROCUREMENT	CONSTRUCTION	O & M	MIL. PERSONNEL	OTHERS	COST CATEGORY TOTAL
CONTRACTOR	15,000	0	0	0	0	0	15,000
% OF COST CATEGORY TOTAL	100.0	0.0	0.0	0.0	0.0	0.0	100.0
% OF FUNDING TYPE TOTAL	100.0	0.0	0.0	0.0	0.0	0.0	4.7
PROGRAM MANAGEMENT	0	0	0	0	0	0	0
% OF COST CATEGORY TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	100.0
% OF FUNDING TYPE TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TESTING	0	0	0	0	0	0	0
% OF COST CATEGORY TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	100.0
% OF FUNDING TYPE TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PRIME EQUIPMENT	0	80,164	0	0	0	0	80,164
% OF COST CATEGORY TOTAL	0.0	100.0	0.0	0.0	0.0	0.0	100.0
% OF FUNDING TYPE TOTAL	0.0	37.4	0.0	0.0	0.0	0.0	25.2
TRAINING	0	0	0	95	9,372	0	9,467
% OF COST CATEGORY TOTAL	0.0	0.0	0.0	1.0	99.0	0.0	100.0
% OF FUNDING TYPE TOTAL	0.0	0.0	0.0	0.1	62.8	0.0	3.0
SUPPLY SUPPORT	0	131,357	0	6,046	0	0	137,403
% OF COST CATEGORY TOTAL	0.0	95.6	0.0	4.4	0.0	0.0	100.0
% OF FUNDING TYPE TOTAL	0.0	61.3	0.0	8.3	0.0	0.0	43.2
TECHNICAL DATA	0	605	0	1,384	0	0	1,989
% OF COST CATEGORY TOTAL	0.0	30.4	0.0	69.6	0.0	0.0	100.0
% OF FUNDING TYPE TOTAL	0.0	0.3	0.0	1.9	0.0	0.0	0.6
SUPPORT EQUIPMENT	0	2,225	0	0	0	0	2,225
% OF COST CATEGORY TOTAL	0.0	100.0	0.0	0.0	0.0	0.0	100.0
% OF FUNDING TYPE TOTAL	0.0	1.0	0.0	0.0	0.0	0.0	0.7
OPERATION	0	0	0	0	0	0	0
% OF COST CATEGORY TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	100.0
% OF FUNDING TYPE TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAINTENANCE	0	0	314	65,670	5,546	0	71,529
% OF COST CATEGORY TOTAL	0.0	0.0	0.4	91.8	7.8	0.0	100.0
% OF FUNDING TYPE TOTAL	0.0	0.0	100.0	89.7	37.2	0.0	22.5
FUNDING TYPE TOTAL	15,000	214,350	314	73,195	14,917	0	317,776
% OF LIFE CYCLE COST	4.7	67.5	0.1	23.0	4.7	0.0	100.0

3.3.8 Cost_Breakdown_by_Year

This report lists the cost elements along with their CBS numbers and their annual costs in five year groups.

DATE OCT 01,1980 LIFE CYCLE COST RUN FOR B52 HARDWARE/F-15 CONFIGURATION PAGE 0.001

COST BREAKDOWN BY YEAR

$$$ COSTS IN THOUSAND DOLLARS $$$ ******BASE YEAR=__81 ,CONSTANT DOLLARS******

COST BREAKDOWN STRUCTURE NUMBER	COST BREAKDOWN STRUCTURE ELEMENT	COST FOR YEAR __81	__82	__83	__84	__85
000000	TOTAL LIFE CYCLE	15,097	167,491	62,238	7,677	7,677
100000	RESEARCH AND DEVELOPMENT	15,000	0	0	0	0
200000	INVESTMENT	97	161,553	54,361	0	0
210000	GOVERNMENT PROGRAM MANAGEMENT	0	0	0	0	0
220000	PRIME EQUIPMENT ACQUISITION	0	60,123	20,041	0	0
221000	PRODUCTION HARDWARE	0	60,123	20,041	0	0
222000	PRODUCTION SUPPORT AND SERVICES	0	0	0	0	0
223000	PRODUCTION TEST AND EVALUATION	0	0	0	0	0
224000	TRANSPORTATION	0	0	0	0	0
225000	INSTALLATION AND CHECKOUT	0	0	0	0	0
230000	INITIAL SUPPORT ACQUISITION	97	101,431	34,320	0	0
231000	SUPPORT AND TEST EQUIPMENT ACQUISITION	0	1,453	742	0	0
232000	SUPPLY SUPPORT	0	98,470	32,887	0	0
232100	INITIAL SPARES	0	98,470	32,887	0	0
232110	PRIME EQUIPMENT	0	98,064	32,695	0	0
232120	SUPPORT AND TEST EQUIPMENT	0	396	193	0	0
232200	NEW NSN ENTRY INTO THE SUPPLY SYSTEM	0	0	0	0	0
233000	FACILITIES	0	0	0	0	0
233100	OPERATIONAL	0	0	0	0	0
233200	MAINTENANCE	0	0	0	0	0
234000	DOCUMENTATION	0	305	300	0	0
234100	ACQUISITION	0	298	298	0	0
234200	REPRODUCTION AND DISTRIBUTION	0	6	2	0	0
235000	TRAINING	97	1,174	391	0	0
235100	OPERATOR	0	0	0	0	0
235200	O/I LEVEL MAINTENANCE	0	1,174	391	0	0
235300	DEPOT LEVEL MAINTENANCE	36	0	0	0	0
235400	INSTRUCTOR	62	0	0	0	0
235500	TRAINING AIDS	0	0	0	0	0
300000	OPERATING AND SUPPORT	0	5,938	7,677	7,677	7,677
310000	OPERATION	0	0	0	0	0
311000	PERSONNEL	0	0	0	0	0
312000	FACILITIES	0	0	0	0	0
313000	ENERGY CONSUMPTION	0	0	0	0	0
314000	MATERIAL CONSUMPTION	0	0	0	0	0
315000	SOFTWARE MAINTENANCE	0	0	0	0	0
320000	SUPPORT	0	5,938	7,677	7,677	7,677
321000	CORRECTIVE MAINTENANCE	0	4,319	5,759	5,759	5,759
321100	LABOR	0	516	687	687	687
321110	O/I LEVEL (REMOVE & REPLACE)	0	42	56	56	56
321120	O/I LEVEL (REPAIR)	0	0	0	0	0
321130	DEPOT LEVEL (REPAIR)	0	473	631	631	631
321200	REPAIR MATERIAL	0	1,125	1,500	1,500	1,500

3.3.9 Cost_Breakdown_Totals

This report lists the cost elements along with their accumulated life cycle totals. The percentage of the total life cycle cost is also listed for each cost element.

DATE OCT 01,1980 LIFE CYCLE COST RUN FOR BS2 HARDWARE/F-15 CONFIGURATION PAGE 9.001

COST BREAKDOWN TOTALS

$$$ COSTS IN THOUSAND DOLLARS $$$ ******BASE YEAR=__81 ,CONSTANT DOLLARS******

COST BREAKDOWN STRUCTURE NUMBER	COST BREAKDOWN STRUCTURE ELEMENT	TOTAL ADJUSTED COST	<----------PERCENTS OF TOTAL ADJUSTED COST----------> FOR TOTAL LIFE CYCLE				
000000	TOTAL LIFE CYCLE	317,776					100.0
100000	RESEARCH AND DEVELOPMENT	15,000				4.7	
200000	INVESTMENT	216,012				68.0	
210000	GOVERNMENT PROGRAM MANAGEMENT	0			0.0		
220000	PRIME EQUIPMENT ACQUISITION	80,164			25.2		
221000	PRODUCTION HARDWARE	80,164		25.2			
222000	PRODUCTION SUPPORT AND SERVICES	0		0.0			
223000	PRODUCTION TEST AND EVALUATION	0		0.0			
224000	TRANSPORTATION	0		0.0			
225000	INSTALLATION AND CHECKOUT	0		0.0			
230000	INITIAL SUPPORT ACQUISITION	135,848			42.7		
231000	SUPPORT AND TEST EQUIPMENT ACQUISITION	2,225		0.7			
232000	SUPPLY SUPPORT	131,357		41.3			
232100	INITIAL SPARES	131,357	41.3				
232110	PRIME EQUIPMENT	130,779	41.2				
232120	SUPPORT AND TEST EQUIPMENT	578	0.2				
232200	NEW NSN ENTRY INTO THE SUPPLY SYSTEM	0	0.0				
233000	FACILITIES	0		0.0			
233100	OPERATIONAL	0	0.0				
233200	MAINTENANCE	0	0.0				
234000	DOCUMENTATION	605		0.2			
234100	ACQUISITION	597	0.2				
234200	REPRODUCTION AND DISTRIBUTION	8	0.0				
235000	TRAINING	1,662		0.5			
235100	OPERATOR	0	0.0				
235200	O/I LEVEL MAINTENANCE	1,565	0.5				
235300	DEPOT LEVEL MAINTENANCE	36	0.0				
235400	INSTRUCTOR	62	0.0				
235500	TRAINING AIDS	0	0.0				
300000	OPERATING AND SUPPORT	86,764				27.3	
310000	OPERATION	0			0.0		
311000	PERSONNEL	0		0.0			
312000	FACILITIES	0		0.0			
313000	ENERGY CONSUMPTION	0		0.0			
314000	MATERIAL CONSUMPTION	0		0.0			
315000	SOFTWARE MAINTENANCE	0		0.0			
320000	SUPPORT	86,764			27.3		
321000	CORRECTIVE MAINTENANCE	63,352		19.9			
321100	LABOR	7,361	2.4				
321110	O/I LEVEL (REMOVE & REPLACE)	619	0.2				
321120	O/I LEVEL (REPAIR)	0	0.0				
321130	DEPOT LEVEL (REPAIR)	6,943	2.2				
321200	REPAIR MATERIAL	16,503	5.2				

3.3.10 General_Funding_Report

This report lists the cost elements with their total life cycle cost broken down into the different funding types.

DATE OCT 01,1980 LIFE CYCLE COST RUN FOR B52 HARDWARE/F-15 CONFIGURATION PAGE 10.001

GENERAL FUNDING REPORT

$$$ COSTS IN THOUSAND DOLLARS $$$ ######BASE YEAR=_ 81 ,CONSTANT DOLLARS######

COST BREAKDOWN STRUCTURE NUMBER	COST BREAKDOWN STRUCTURE ELEMENT	<- - - - - - - - - GENERAL TYPE OF FUNDING - - - - - - - - -> R & D	PROCURE-MENT	CONSTRUC-TION	O & M	MIL. PER-SONNEL	OTHERS	TOTAL
000000	TOTAL LIFE CYCLE	15,000	276,499	314	73,193	14,057	0	379,065
100000	RESEARCH AND DEVELOPMENT	15,000	0	0	0	0	0	15,000
200000	INVESTMENT	0	276,499	0	36	766	0	277,301
210000	GOVERNMENT PROGRAM MANAGEMENT	0	0	0	0	0	0	0
220000	PRIME EQUIPMENT ACQUISITION	0	142,317	0	0	0	0	142,317
221000	PRODUCTION HARDWARE	0	142,317	0	0	0	0	142,317
222000	PRODUCTION SUPPORT AND SERVICES	0	0	0	0	0	0	0
223000	PRODUCTION TEST AND EVALUATION	0	0	0	0	0	0	0
224000	TRANSPORTATION	0	0	0	0	0	0	0
225000	INSTALLATION AND CHECKOUT	0	0	0	0	0	0	0
230000	INITIAL SUPPORT ACQUISITION	0	134,182	0	36	766	0	134,984
231000	SUPPORT AND TEST EQUIPMENT ACQUISITION	0	2,225	0	0	0	0	2,225
232000	SUPPLY SUPPORT	0	131,357	0	0	0	0	131,357
232100	INITIAL SPARES	0	131,357	0	0	0	0	131,357
232110	PRIME EQUIPMENT	0	130,779	0	0	0	0	130,779
232120	SUPPORT AND TEST EQUIPMENT	0	578	0	0	0	0	578
232200	NEW NSN ENTRY INTO THE SUPPLY SYSTEM	0	0	0	0	0	0	0
233000	FACILITIES	0	0	0	0	0	0	0
233100	OPERATIONAL	0	0	0	0	0	0	0
233200	MAINTENANCE	0	0	0	0	0	0	0
234000	DOCUMENTATION	0	601	0	0	0	0	601
234100	ACQUISITION	0	597	0	0	0	0	597
234200	REPRODUCTION AND DISTRIBUTION	0	4	0	0	0	0	4
235000	TRAINING	0	0	0	36	766	0	802
235100	OPERATOR	0	0	0	0	0	0	0
235200	O/I LEVEL MAINTENANCE	0	0	0	0	704	0	704
235300	DEPOT LEVEL MAINTENANCE	0	0	0	36	0	0	36
235400	INSTRUCTOR	0	0	0	0	62	0	62
235500	TRAINING AIDS	0	0	0	0	0	0	0
300000	OPERATING AND SUPPORT	0	0	314	73,160	13,291	0	86,764
310000	OPERATION	0	0	0	0	0	0	0
311000	PERSONNEL	0	0	0	0	0	0	0
312000	FACILITIES	0	0	0	0	0	0	0
313000	ENERGY CONSUMPTION	0	0	0	0	0	0	0
314000	MATERIAL CONSUMPTION	0	0	0	0	0	0	0
315000	SOFTWARE MAINTENANCE	0	0	0	0	0	0	0
320000	SUPPORT	0	0	314	73,160	13,291	0	86,764
321000	CORRECTIVE MAINTENANCE	0	0	6	62,733	619	0	63,352
321100	LABOR	0	0	0	6,943	619	0	7,561
321110	O/I LEVEL (REMOVE & REPLACE)	0	0	0	0	619	0	619
321120	O.I LEVEL (REPAIR)	0	0	0	0	0	0	0
321130	DEPOT LEVEL (REPAIR)	0	0	0	6,943	0	0	6,943
321200	REPAIR MATERIAL	0	0	0	16,503	0	0	16,503

3.3.11 Annual_Cost_by_Funding_Type

This report lists the annual totals broken down into the separate funding types.

DATE OCT 01,1980 LIFE CYCLE COST RUN FOR B52 HARDWARE/F-15 CONFIGURATION PAGE 11.001

ANNUAL COST BY FUNDING TYPE

COSTS IN THOUSAND DOLLARS ### ######BASE YEAR=__81 ,CONSTANT DOLLARS######

	FUNDING TYPE						
YEAR	R & D	PROCUREMENT	CONSTRUCTION	O & M	MIL. PERSONNEL	OTHERS	TOTAL
__81	15,000	0	0	36	62	0	15,097
__82	0	206,992	22	3,010	1,493	0	213,517
__83	0	69,307	28	6,640	1,326	0	77,501
__84	0	0	28	6,640	1,208	0	7,877
__85	0	0	28	6,640	1,208	0	7,877
__86	0	0	29	6,640	1,205	0	7,877
__87	0	0	28	6,640	1,208	0	7,877
__88	0	0	28	6,640	1,208	0	7,877
__89	0	0	28	6,640	1,208	0	7,877
__90	0	0	28	6,640	1,208	0	7,877
__91	0	0	28	6,640	1,208	0	7,877
__92	0	0	28	6,640	1,208	0	7,877
__93	0	0	8	1,730	302	0	2,060
TOTAL	15,000	276,499	314	73,195	14,057	0	379,065

3.3.12 Annual_Cost_by_Cost_Category

This report lists the annual totals broken down into cost categories.

DATE OCT 01,1980 LIFE CYCLE COST RUN FOR B52 HARDWARE/F-15 CONFIGURATION PAGE 12.001

ANNUAL COST BY COST CATEGORY

COSTS IN THOUSAND DOLLARS ### ######BASE YEAR=1981 ,CONSTANT DOLLARS######

YEAR	COST CATEGORY										
	CONTRACTOR	PROGRAM MANAGEMENT	TESTING	PRIME EQUIPMENT	TRAINING	SUPPLY SUPPORT	TECHNICAL DATA	SUPPORT EQUIPMENT	OPERATION	MAINTEN-ANCE	TOTAL
81	15,000	0	0	0	97	0	0	0	0	0	15,097
82	0	0	0	106,736	1,120	98,882	417	1,463	0	4,677	213,517
83	0	0	0	35,579	826	33,437	414	742	0	6,503	77,501
84	0	0	0	0	709	550	115	0	0	6,503	7,877
85	0	0	0	0	709	550	115	0	0	6,503	7,877
86	0	0	0	0	709	550	115	0	0	6,503	7,877
87	0	0	0	0	709	550	115	0	0	6,503	7,877
88	0	0	0	0	709	550	115	0	0	6,503	7,877
89	0	0	0	0	709	550	115	0	0	6,503	7,877
90	0	0	0	0	709	550	115	0	0	6,503	7,877
91	0	0	0	0	709	550	115	0	0	6,503	7,877
92	0	0	0	0	709	550	115	0	0	6,503	7,877
93	0	0	0	0	161	137	115	0	0	1,626	2,060
TOTAL	15,000	0	0	142,317	8,607	137,403	1,985	2,225	0	71,529	379,065

3.3.13 Sensitivity_Analysis_Report

This report lists values of the scalar variable or percentages of the array vs. the major cost element totals.

DATE AUG 21,1981 LIFE CYCLE COST EQUIPMENT MODEL FLEX9 TSO TEST RUN PAGE 13.004

SENSITIVITY ANALYSIS

$$$ COSTS IN DOLLARS $$$ ******BASE YEAR= 1 ,CONSTANT DOLLARS******

SENSITIZED VARIABLE:
IR MULTIPLIER FOR INFLATION RATES (IRCON, IROM, IRPROC, AND IRRD) FOR SENSITIVITY ANALYSIS

SEN. NUM.	VALUE	COST ELEMENT DEVELOPMENT $	%	INVESTMENT $	%	O&S $	%	TOTAL LIFE CYCLE $	%
0	1.00	3,960,000	0.0	11,617,224	0.0	30,880,301	0.0	46,457,525	0.0
1	0.50	3,960,000	0.0	11,617,224	0.0	30,880,301	0.0	46,457,525	0.0
2	0.60	3,960,000	0.0	11,617,224	0.0	30,880,301	0.0	46,457,525	0.0
3	0.70	3,960,000	0.0	11,617,224	0.0	30,880,301	0.0	46,457,525	0.0
4	0.80	3,960,000	0.0	11,617,224	0.0	30,880,301	0.0	46,457,525	0.0
5	0.90	3,960,000	0.0	11,617,224	0.0	30,880,301	0.0	46,457,525	0.0
6	1.00	3,960,000	0.0	11,617,224	0.0	30,880,301	0.0	46,457,525	0.0
7	1.10	3,960,000	0.0	11,617,224	0.0	30,880,301	0.0	46,457,525	0.0
8	1.20	3,960,000	0.0	11,617,224	0.0	30,880,301	0.0	46,457,525	0.0
9	1.30	3,960,000	0.0	11,617,224	0.0	30,880,301	0.0	46,457,525	0.0
10	1.40	3,960,000	0.0	11,617,224	0.0	30,880,301	0.0	46,457,525	0.0
11	1.50	3,960,000	0.0	11,617,224	0.0	30,880,301	0.0	46,457,525	0.0

SEN. NUM. 0 DENOTES BASE VALUES
% - PERCENT CHANGE FROM BASE VALUE

DATE AUG 21,1981 LIFE CYCLE COST EQUIPMENT MODEL FLEX9 TSO TEST RUN PAGE 13.005

SENSITIVITY ANALYSIS

$$$ COSTS IN DOLLARS $$$ ******BASE YEAR= 1 ,CONSTANT DOLLARS******

MATRIX OF VALUES FOR THE SENSITIVITY ANALYSIS OF VARIABLE IR

SEN. NUM.		0	1	2	3	4	5	6	7	8	9	10	11
MULTIPLIER		1.00	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.30	1.40	1.50
ARRAY INDEX													
1	1	0.05	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07
1	2	0.05	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07
1	3	0.05	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07
1	4	0.05	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07
1	5	0.05	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07
2	1	0.06	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08	0.09
2	2	0.06	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08	0.09
2	3	0.06	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08	0.09
2	4	0.06	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.09	0.09
2	5	0.06	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.09	0.09
3	1	0.06	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08
3	2	0.06	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08
3	3	0.06	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08
3	4	0.06	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08
3	5	0.06	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08
4	1	0.07	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.10	0.10
4	2	0.07	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.10	0.10
4	3	0.07	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.10	0.10
4	4	0.07	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.10	0.10
4	5	0.07	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.10	0.10

SEN. NUM. 0 DENOTES BASE VALUES
% - PERCENT CHANGE FROM BASE VALUE

3.3.14 Inflated and Discounted Costs

In addition to the constant dollar reports, the user has the option of specifying whether or not he also wants inflated dollar reports, inflated and discounted dollar reports, or any combination of all three outputs. This is controlled by the CN card and is described in section 3.2.4 entitled "DATA File."

If the user does specify these additional reports, they will appear in the following order:

1. Constant dollar reports
2. Inflated dollar reports
3. Inflated and discounted dollar reports

3.3.15 Multiple Runs

FLEX also gives the user the option of changing any or all of the information inputted to the model and rerunning the program all during one session. This is accomplished by setting the JCL run parameter and modifying the individual input data sets. The run parameter is labeled PARM.GO and set equal to a value of '3' in the JCL sample (~~section 4.1~~ Appendix C, line #590.) The input data sets can be modified for multiple runs by adding the data changes for each run and separating them by the appropriate ENDXX Cards. (It should be noted here that fatal errors will occur if an insufficient amount of ENDXX Cards are included in any data set. The general rule is that the user should have at least as many ENDXX cards as there are runs in every input data set.)

4.0 REFERENCES

Life Cycle Cost Guide for Major Weapon Systems, the Naval Weapons Support Activity, Engineering Management Department, Cost Management Division, November 1977.

Life Cycle Cost Guide for Equipment Analysis, the Naval Weapons Engineering Support Activity Management Engineering Department, Cost Management Division, January 1977.

APPENDIX A

GLOSSARY OF TERMS

ANNUAL: Throughout the program the word "annual" refers to the length of the reporting periods and not necessarily to years.

ARRAY VARIABLES: A set of variables that have an identical name and are differentiated by a subscript. For example: A is defined to be an array of three variables, A(1), A(2), and A(3). Each variable in this array can have a unique value.

ARRAYS: See ARRAY VARIABLES

CBS: See COST BREAKDOWN STRUCTURE

CBS NUMBER: See COST BREAKDOWN STRUCTURE NUMBER

CONSTANT DOLLARS: See DOLLARS, CONSTANT

COST BREAKDOWN STRUCTURE: A hierarchical listing of all or the cost components of a system throughout its life cycle. A tree-like structure which accounts for, and accurately lists, all of the relevant costs of the system. The CBS is the backbone structure used to calculate the life cycle cost. (See section 2.2)

COST BREAKDOWN STRUCTURE NUMBER: The six digit number associated with the particular cost element in the CBS. This number defines the position and indenting of the cost element to the computer.

COST CATEGORIES: Up to ten major categories which serve to label individual costs of a similar nature so that they may be tracked as a group.

COST ELEMENT: Any of the individual lines in the CBS. The cost element specifies an individual cost or a subsystem of related costs that are part of an entire system.

COST EQUATION: The equation that is associated with a primary cost element. The cost equation predicts the annual cost or an item throughout the life cycle.

CS FILE: The file which updates the cost breakdown structure and equation for each individual run. (See section 3.2.2)

CSDEL FILE: The file which contains the cost breakdown structure and equations at the start of the program. The CS-EQ default file. (See section 3.2.3)

DATA FILE: The input file which contains the output report

control card (CR Card), the remark cards (RM Cards), and the NAMELIST input. (See section 3.2.4)

DEFAULT FILE: The files used in entering the initial data values for a single run or a multiple-run set. (See CSDFD, DSDFD)

DOLLARS, CONSTANT: Costs that are not subject to inflation or discount rates.

DOLLARS, INFLATED: Costs that are figured using an inflation rate and will increase annually to match the economic situation.

DOLLARS, INFLATED AND DISCOUNTED: Costs that are figured using both inflation and discount rates so as to match the economic situation.

DSDEL FILE: The file which sets the variable definitions and values at the start of the program. (See section 3.2.3)

FLEX: The name given to the modified version of the Naval Life Cycle Cost FLEX Model 96 model.

EQUATION ELEMENTS: Any variable, subscript or operator used in the cost equations.

FUNDING TYPES: Up to six categories relating government funding agencies to program costs. Individual costs are grouped into these funding types and may be tracked as such.

INFLATED AND DISCOUNTED DOLLARS: See DOLLARS, INFLATED AND DISCOUNTED.

INFLATED DOLLARS: See DOLLARS, INFLATED

INPUT FILES: The seven files required to run the FLEX program. (See section 3.2)

JCL: See JOB CONTROL LANGUAGE

JOB CONTROL LANGUAGE: The IBM system computer language used for manipulating files and setting up and executing programs. (For a specific example, see section 4.1.)

LCC: See LIFE CYCLE COST

LIFE CYCLE COST: The cost of the system incurred during its entire lifetime.

MAJOR COST ELEMENT: The lines in the CBS whose numbers are of the form X00000, where "X" is an integer greater than 0. The major division items in a CBS.

MCE: See MAJOR COST ELEMENT

NAMELIST INPUT: The section of the DATA file which inputs variable values into the program. These values are used internally in FLEX and cannot be entered in the CSDFL or CS files.

NV FILE: The file which updates the variable for each individual run (see section 3.2.7.)

O&M: Abbreviation for Operation and Maintenance.

OUTPUT FILES: The optional data collection files RES1 and RES2 which are used in post-processor summary programs.

OUTPUT REPORTS: Any of the reports covered in section 3.3 which FLEX makes available to the user. The output of these reports is controlled by the CN card as part of the DATA file (section 3.2.4.)

PCE: See PRIMARY COST ELEMENT

PRIMARY COST ELEMENT: The most subdivided or highest indentured item in the cost breakdown structure. The cost elements which cannot be broken down to a greater degree. The primary cost elements are those which have equations describing their cost throughout the life cycle.

R&D: Abbreviation for Research and Development.

REVERSED POLISH NOTATION: The method by which cost equations are encoded as input to FLEX in the CSDFL or CS files. (See section 3.2.3)

REPORTING PERIOD: The time periods for which FLEX generates output data reflecting the predicated cost or the system (i.e., monthly reports, yearly reports, etc.).

RPN: See REVERSED POLISH NOTATION

SA FILE: The file which indicates which variables are to be sensitized over a specified range. (See section 3.2.8)

SCALAR VARIABLES: Variables defined in the CSDFL or NV files which can only hold one value (as opposed to array variables.) Scalar variables are those which do not contain subscripts.

SUBSCRIPTED VARIABLES: See ARRAY VARIABLES

TOTAL LIFE CYCLE: Refers to the entire lifetime of a system.

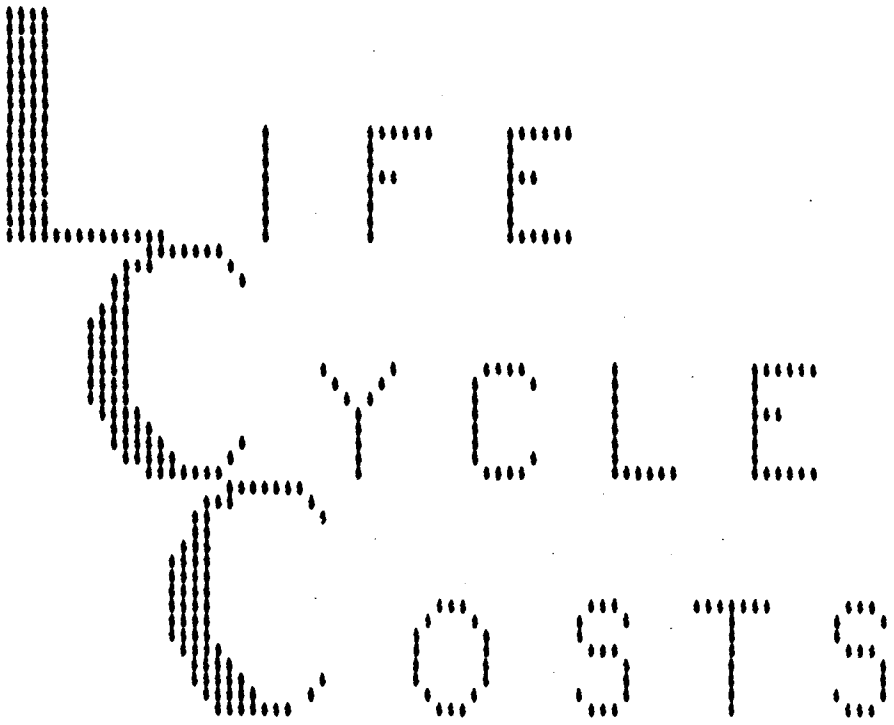
UPDATE FILE: Input files which update values for each individual run or a multiple-run set.

YEAR: Refers to one reporting period and may not actually have the length of one year depending on the user's definitions and input data.

APPENDIX B

FLEX SAMPLE RUN

DATE AUG 27,1981



(LCC FLEX)

ANALYSIS IDENTIFICATION: LIFE CYCLE COST EQUIPMENT MODEL FLEX9 TSO TEST RUN

LIFE CYCLE COST EQUIPMENT MODEL FLEX9 TSO TEST RUN

INPUT DATA LISTING AND ERROR DIAGNOSTICS

NV MODIFICATIONS

```
NV  NK          15.                                                  195
NV  NN          2.                                                   196
NV  AD(Y)       300000.4*0.                                          197
NV  ADC(Y)      500000.4*0.                                          198
NV  ADG(Y)      250000.4*0.                                          199
NV  ATU(Y)      50000.4*0.                                           200
```

INPUT DATA LISTING AND ERROR DIAGNOSTICS

NV MODIFICATIONS

```
NV  CE          2.                                                                                                  201
NV  CIPE        1500.                                                                                               202
NV  CM          .50                                                                                                 203
NV  CP          .05                                                                                                 204
NV  CS(Y)       2*0,3*15000.                                                                                        205
NV  CSD         2.4                                                                                                 206
NV  CSI         240.                                                                                                207
NV  CSO         240.                                                                                                208
NV  CST(NK)     750,1200,5000,4200,1700,2*3500,9000,4*500,2*2500,6000.                                              209
NV  CTI         1000.                                                                                               210
NV  CTM         750.                                                                                                211
NV  CTO         500.                                                                                                212
NV  CTP         1000.                                                                                               213
NV  CTPE        600.                                                                                                214
NV  CU          20000.                                                                                              215
NV  DC(NK)      4*.75,1,3*.75,7*1.                                                                                  216
NV  DCD(Y)      150000,4*0.                                                                                         217
NV  DCE(Y)      800000,4*0.                                                                                         218
NV  DCH(Y)      600000,4*0.                                                                                         219
NV  DCPM(Y)     200000,4*0.                                                                                         220
NV  DCS(Y)      150000,4*0.                                                                                         221
NV  DCST(Y)     350000,4*0.                                                                                         222
NV  DCTE(Y)     75000,4*0.                                                                                          223
NV  DGPM(Y)     550000,4*0.                                                                                         224
NV  DGTA(Y)     50000,4*0.                                                                                          225
NV  DGTE(Y)     275000,4*0.                                                                                         226
NV  DGTT(Y)     10000,4*0.                                                                                          227
NV  DSC(NK)     1.,2,.1,.1,0,.1,0,6*.1                                                                              228
NV  FDRT        117.                                                                                                229
NV  FILS        90.                                                                                                 230
NV  FIRT        3.                                                                                                  231
NV  FM          .12                                                                                                 232
NV  FMS(Y)      0,400000,200000,2*0.                                                                                233
NV  FOS(Y)      0,150000,75000,2*0.                                                                                 234
NV  FPST        411.                                                                                                235
NV  FR(Y)       1,1,1,.9,.75                                                                                        236
NV  ISSD(Y)     0,4*250.                                                                                            237
NV  ISSI(Y)     0,4*1000.                                                                                           238
NV  IYI         2.                                                                                                  239
NV  LO(Y)       2*0,60,2*100.                                                                                       240
NV  LM(Y)       2*0,80,2*100.                                                                                       241
NV  LP(Y)       2*0,3*10.                                                                                           242
NV  LPM(NM)     8,15.                                                                                               243
NV  LSD(NK)     0,7,10,6,0,9,6,20,4*5,10,5,15.                                                                      244
NV  LSI(NK)     0,5,12,4,8,6,5,15,4*3,7,3,11.                                                                       245
NV  LSO(NK)     3,2,1.6,2.6,4,2*3,4,4*2,4,1,3.                                                                      246
NV  MPM(NM)     50,150.                                                                                             247
NV  MSSD(Y)     0,4*150.                                                                                            248
NV  MSSI(Y)     0,4*1000.                                                                                           249
NV  N(Y)        2*0,60,2*100.                                                                                       250
```

INPUT DATA LISTING AND ERROR DIAGNOSTICS

NV MODIFICATIONS

```
NV  NC(Y)       0,25,3*0.                                                    251
NV  NN(Y)       0,50,30,20,0.                                                252
NV  NOM(Y)      4*0,60.                                                      253
NV  NP          200.                                                         254
NV  NPM(NM)     100,400.                                                     255
NV  NPO(Y)      4*0,15.                                                      256
NV  NSHP        75.                                                          257
NV  NSNS        350.                                                         258
NV  OHL         120.                                                         259
NV  OHM         1500.                                                        260
NV  OHT         500.                                                         261
NV  OT          1600.                                                        262
NV  PMQ(Y)      0,650000,270000,0,0.                                         263
NV  PO          1.                                                           264
NV  PSOS        50.                                                          265
NV  PSS(Y)      0,350000,3*0.                                                266
NV  PTE(Y)      0,50000,3*0.                                                 267
NV  PTI(Y)      0,15,3*0.                                                    268
NV  PTM(Y)      0,50,30,20,0.                                                269
NV  PTO(Y)      0,50,30,20,0.                                                270
NV  PTP(Y)      0,10,3*0.                                                    271
NV  QTY(NK)     2,4,1,3,6,1,2,1,4*2,3*1.                                     272
NV  R(NK)       750,500,870,600,250,400,600,900,4*350,700,1200,1500.         273
NV  RAM         .40                                                          274
NV  RAP         .13                                                          275
NV  RDM         100.                                                         276
NV  RIE         100.                                                         277
NV  RIM         100.                                                         278
NV  RO          7.87                                                         279
NV  RPL         1.                                                           280
NV  RPM         .5                                                           281
NV  RSD         17.22                                                        282
NV  RSL         7.87                                                         283
NV  RSR         .104                                                         284
NV  RSS(NK)     1.,.8,.7,.5,1,.8,.6,.9,4*.85,.5,.7,.4                        285
NV  RW(NK)      15*1.25                                                      286
NV  STE(Y)      500000,4*0.                                                  287
NV  STEM        .25                                                          288
NV  STES        5000.                                                        289
NV  TERM        1200.                                                        290
NV  W1(NK)      75,100,170,300,250,190,300,50,600,450,275,310,140,260.       291
NV  W(NK)       700.                                                         292
```

INPUT DATA LISTING AND ERROR DIAGNOSTICS

NAMELIST DATA

```
CN11111 71111111    0                                                    293
RM        THIS PROGRAM IS BASED ON COST ALGORITHIMS PROVIDED BY THE      294
RM     NAVAL WEAPONS ENGINEERING SUPPORT ACTIVITY MANAGEMENT ENGINEERING 295
RM     DEPARTMENT COST MANAGEMENY DIVISION.                              296
RM                                                                       297
RM                                                                       298
RM                                                                       299
RM  CN CARD DESCRIPTION                                                  300
RM
```

INPUT DATA LISTING AND ERROR DIAGNOSTICS

NAMELIST DATA

```
RM  COLUMN     DESCRIPTION                                                          301
RM   1-2       CARD TYPE 'CN'                                                       302
RM     3       EQUATION                                                             303
RM     4       REMARKS                                                              304
RM     5       DICTIONARY                                                           305
RM     6       VARIABLE VALUES                                                      306
RM     7       COST ADJUSTMENT FACTORS                                              307
RM     8       NOT USED                                                             308
RM     9       SUMMARY                                                              309
RM    10       FUNDING BY COST CATEGORY                                             310
RM    11       COST BREAKDOWN BY YEAR                                               311
RM    12       COST BREAKDOWN TOTALS                                                312
RM    13       GENERAL FUNDING                                                      313
RM    14       ANNUAL COST BY FUNDING                                               314
RM    15       ANNUAL COST BY COST CATEGORIES                                       315
RM    16       SENSITIVITY ANALYISIS                                                316
RM    20       INFLATION RATE/FACTOR INPUT OPTION ( BLANK OR 0 RATE, 1 FACTOR )     317
RM                                                                                  318
RM                                                                                  319
RM  CS CARD DESCRIPTION                                                             320
RM                                                                                  321
RM  COLUMN     DESCRIPTION                                                          322
RM    1-2      CARD TYPE "CS"                                                       323
RM    3-8      COST BREAKDOWN STRUCTURE NUMBER                                      324
RM   11-50     COST ELEMENT DESCRIPTION                                             325
RM   55-56     COST CATEGORY                                                        326
RM    60       FUNDING TYPE                                                         327
RM    65       INFLATION FACTOR TYPE                                                328
RM    70       EQUATION CODE                                                        329
RM   73-78     DELETE                                                               330
RM                                                                                  331
RM                                                                                  332
RM  EQ CARD DESCRIPTION                                                             333
RM  COLUMN     DESCRIPTION                                                          334
RM    1-2      CARD TYPE "EQ"                                                       335
RM    3-8      COST BREAKDOWN STRUCTURE NUMBER                                      336
RM   11-80     COST EQUATION                                                        337
RM                                                                                  338
RM                                                                                  339
RM  DS CARD DESCRIPTION                                                             340
RM                                                                                  341
RM  COLUMN     DESCRIPTION                                                          342
RM    1-2      CARD TYPE "DS"                                                       343
RM    5-15     VARIABLE NAME                                                        344
RM   16-72     VARIABLE DESCRIPTION                                                 345
RM                                                                                  346
RM                                                                                  347
RM  NV CARD DESCRIPTION                                                             348
RM                                                                                  349
RM  COLUMN     DESCRIPTION                                                          350
```

INPUT DATA LISTING AND ERROR DIAGNOSTICS

NAMELIST DATA

```
RM    1-2     CARD TYPE "NV"                                                    331
RM    5-15    VARIABLE NAME                                                     332
RM   16-80    VARIABLE VALUE  (IF VALUES CONTINUED END WITH A COMMA)            333
RM                                                                              334
RM                                                                              335
RM  SA (SENSITIVITY ANALYISIS ) CARD DESCRIPTION                                336
RM                                                                              337
RM  COLUMN    DESCRIPTION                                                       338
RM    1-2     CARD TYPE "SA"                                                    339
RM   10-17    VARIABLE NAME                                                     340
RM   20-29    LOWER VALUE                                                       341
RM   30-39    UPPER VALUE                                                       342
RM   40-49    ROW SELECTION                                                     343
RM   50-59    COLUMN SELECTION                                                  344
 &INPUT                                                                         345
        BY=1.     Y=8.                                                         346
 IRRD=5H.05,   IRPROC=5H.06,   IRCON=5H.055,   IROM=5H.07,   DR=5H.10,          347
 &END                                                                           348
```

```
SA      CU      25000.    75000.                                        369
SA      P       0.5       1.5                                           370
SA      IR      .5        1.5                                           371
```

*** INPUT STATISTICS ***
371 CARDS READ
0 ERRORS
3 SYSTEM SCALARS 44 USER SCALARS 53 ARRAYS 366 ARRAY ELEMENTS

INPUT DATA LISTING AND ERROR DIAGNOSTICS

CURRENT CS FILE

```
CS000000  TOTAL LIFE CYCLE                                                    372
CS100000  RESEARCH AND DEVELOPMENT                                            373
CS110000  VALIDATION                                                          374
CS111000  CONTRACTOR                          01   1    1    1               375
EQ111000  ADC(I);I,1,Y                                                        376
CS112000  GOVERNMENT                          02   1    1    1               377
EQ112000  ADG(I);I,1,Y                                                        378
CS120000  FULL SCALE DEVELOPMENT                                              379
CS121000  CONTRACTOR                                                          380
CS121100  MANAGEMENT                          01   1    1    1               381
EQ121100  DCPM(I);I,1,Y                                                       382
CS121200  ENGINEERING                         01   1    1    1               383
EQ121200  DCE(I);I,1,Y                                                        384
CS121300  PROTOTYPE HARDWARE                  01   1    1    1               385
EQ121300  DCH(I);I,1,Y                                                        386
CS121400  SOFTWARE                            01   1    1    1               387
EQ121400  DCS(I);I,1,Y                                                        388
CS121500  TEST AND EVALUATION                 01   1    1    1               389
EQ121500  DCTE(I);I,1,Y                                                       390
CS121600  DOCUMENTATION                       01   1    1    1               391
EQ121600  DCO(I);I,1,Y                                                        392
CS121700  SUPPORT AND TEST EQUIPMENT          01   1    1    1               393
EQ121700  DCST(I);I,1,Y                                                       394
CS122000  GOVERNMENT                                                          395
CS122100  PROGRAM MANAGEMENT                  02   1    1    1               396
EQ122100  DGPM(I);I,1,Y                                                       397
CS122200  PROTOTYPE TEST AND EVALUATION                                       398
CS122210  TRAINING                            05   5    4    1               399
EQ122210  DGTT(I);I,1,Y                                                       400
```

INPUT DATA LISTING AND ERROR DIAGNOSTICS

CURRENT CS FILE

```
CS122220  TEST SITE ACTIVATION                          03  3   3   1          401
EQ122220  DGTA(I);I,1,Y                                                        402
CS122230  TEST AND EVALUATION                           03  1   1   1          403
EQ122230  DGTE(I);I,1,Y                                                        404
CS200000  INVESTMENT                                                           405
CS210000  GOVERNMENT PROGRAM MANAGEMENT                 02  2   2   1          406
EQ210000  PMG(I);I,1,Y                                                         407
CS220000  PRIME EQUIPMENT ACQUISITION                                          408
CS221000  PRODUCTION HARDWARE                           04  2   2   1          409
EQ221000  NN(I),CU,#;I,1,Y                                                     410
CS222000  PRODUCTION SUPPORT AND SERVICES               04  2   2   1          411
EQ222000  PSS(I);I,1,Y                                                         412
CS223000  PRODUCTION TEST AND EVALUATION                03  2   2   1          413
EQ223000  PTE(I);I,1,Y                                                         414
CS224000  TRANSPORTATION                                04  2   2   1          415
EQ224000  NN(I),CTPE,#;I,1,Y                                                   416
CS225000  INSTALLATION AND CHECKOUT                     04  2   2   1          417
EQ225000  NN(I),CIPE,#;I,1,Y                                                   418
CS230000  INITIAL SUPPORT ACQUISITION                                          419
CS231000  SUPPORT AND TEST EQUIPMENT ACQUISITION        06  2   2   1          420
EQ231000  STE(I);I,1,Y                                                         421
CS232000  SUPPLY SUPPORT                                                       422
CS232100  INITIAL SPARES                                                       423
CS232110  PRIME EQUIPMENT                               06  2   2   1          424
EQ232110  NN(I),OT,#,DC(K),#,QTY(K),#,CST(K),#,DSC(K),FPST,FILS,+,#,           425
EQ232110  #SS(K),FIRT,#,FORT,I,#SS(K),-,#,+,I,DSC(K),-,#,+,#,                 426
EQ232110  P(K),FR(I),365,#,#,/;I,1,Y,K,1,NK                                   427
CS232120  SUPPORT AND TEST EQUIPMENT                    06  2   2   1          428
EQ232120  STE(I),STEM,#;I,1,Y                                                  429
CS232200  NEW NSN ENTRY INTO THE SUPPLY SYSTEM          06  4   4   1          430
EQ232200  NSNP,NSNS,+,RIE,#;I,IYI,IYI                                          431
CS233000  FACILITIES                                                           432
CS233100  OPERATIONAL                                   09  3   3   1          433
EQ233100  FOS(I);I,1,Y                                                         434
CS233200  MAINTENANCE                                   10  3   3   1          435
EQ233200  FMS(I);I,1,Y                                                         436
CS234000  DOCUMENTATION                                                        437
CS234100  ACQUISITION                                   07  2   2   1          438
EQ234100  AD(I);I,1,Y                                                          439
CS234200  REPRODUCTION AND DISTRIBUTION                 07  2   2   1          440
EQ234200  NC(I),NP,#,CP,#;I,1,Y                                               441
CS235000  TRAINING                                                             442
CS235100  OPERATOR                                      05  5   4   1          443
EQ235100  PTO(I),CTO,#;I,1,Y                                                   444
CS235200  O/I LEVEL MAINTENANCE                         05  5   4   1          445
EQ235200  PTM(I),CTM,#;I,1,Y                                                   446
CS235300  DEPOT LEVEL MAINTENANCE                       05  4   4   1          447
EQ235300  PTP(I),CTP,#;I,1,Y                                                   448
CS235400  INSTRUCTOR                                    05  5   4   1          449
EQ235400  PTI(I),CTI,#;I,1,Y                                                   450
```

INPUT DATA LISTING AND ERROR DIAGNOSTICS

CURRENT CS FILE

```
CS235500  TRAINING AIDS                                              05   2   2   1         451
EQ235500  ATU(I);I,1,Y                                                                      452
CS300000  OPERATING AND SUPPORT                                                             453
CS310000  OPERATION                                                                         454
CS311000  PERSONNEL                                                  09   5   4   1         455
EQ311000  N(I),PO,*,RO,*,OT,*;I,1,Y                                                         456
CS312000  FACILITIES                                                 09   3   3   1         457
EQ312000  N(I),PSOS,*,CSO,*;I,1,Y                                                           458
CS313000  ENERGY CONSUMPTION                                         09   4   4   1         459
EQ313000  N(I),CE,*,OT,*;I,1,Y                                                              460
CS314000  MATERIAL CONSUMPTION                                       09   4   4   1         461
EQ314000  N(I),CM,*,OT,*;I,1,Y                                                              462
CS315000  SOFTWARE MAINTENANCE                                       09   4   4   1         463
EQ315000  CS(I);I,1,Y                                                                       464
CS320000  SUPPORT                                                                           465
CS321000  CORRECTIVE MAINTENANCE                                                            466
CS321100  LABOR                                                                             467
CS321110  O/I LEVEL ( REMOVE & REPLACE )                             10   5   4   1         468
EQ321110  N(I),OT,*,DC(K),*,QTY(K),*,LSO(K),*,RSL,*;R(K),FR(I),*,/;                         469
EQ321110  I,1,Y,K,1,NK                                                                      470
CS321120  O/I LEVEL ( REPAIR )                                       10   5   4   1         471
EQ321120  N(I),OT,*,DC(K),*,QTY(K),*,LSI(K),*,RSL,*,RSS(K),*,                               472
EQ321120  1,DSC(K),-,*,R(K),FR(I),*,/;I,1,Y,K,1,NK                                          473
CS321130  DEPOT LEVEL ( REPAIR )                                     10   4   4   1         474
EQ321130  N(I),OT,*,DC(K),*,QTY(K),*,LSD(K),*,RSD,*,1,RSS(K),-,*,                           475
EQ321130  1,DSC(K),-,*,R(K),FR(I),*,/;I,1,Y,K,1,NK                                          476
CS321200  REPAIR MATERIAL                                            10   4   4   1         477
EQ321200  N(I),OT,*,DC(K),*,QTY(K),*,CST(K),*,FM,*,1,DSC(K),-,*,                            478
EQ321200  R(K),FR(I),*,/;I,1,Y,K,1,NK                                                       479
CS321300  TRANSPORTATION AND PACKAGING                                                      480
CS321310  MATERIAL HANDLING LABOR                                    10   4   4   1         481
EQ321310  N(I),OT,*,DC(K),*,QTY(K),*,2,*,W(K),*,RPL,*,1,RSS(K),-,*,                         482
EQ321310  1,DSC(K),-,*,R(K),FR(I),*,/;I,1,Y,K,1,NK                                          483
CS321320  PACKAGING MATERIAL                                         10   4   4   1         484
EQ321320  N(I),OT,*,DC(K),*,QTY(K),*,2,*,W(K),*,RPM,*,1,RSS(K),-,*,                         485
EQ321320  1,DSC(K),-,*,R(K),FR(I),*,/;I,1,Y,K,1,NK                                          486
CS321330  SHIPPING                                                   10   4   4   1         487
EQ321330  N(I),OT,*,DC(K),*,QTY(K),*,2,*,W(K),*,RSR,*,RW(K),*,                              488
EQ321330  1,RSS(K),-,*,1,DSC(K),-,*,R(K),FR(I),*,/;I,1,Y,K,1,NK                             489
CS322000  PREVENTIVE MAINTENANCE                                                            490
CS322100  LABOR                                                      10   5   4   1         491
EQ322100  N(I),OT,*,LPM(N),*,RSL,*,NPM(N),/;I,1,Y,N,1,NM                                    492
CS322200  MATERIAL                                                   10   4   4   1         493
EQ322200  N(I),OT,*,MPM(N),*,NPM(N),/;I,1,Y,N,1,NM                                          494
CS323000  OVERHAUL                                                                          495
CS323100  LABOR                                                      10   4   4   1         496
EQ323100  NOH(I),OHL,*,RSD,*;I,1,Y                                                          497
CS323200  MATERIAL                                                   10   4   4   1         498
EQ323200  NOH(I),OHM,*;I,1,Y                                                                499
CS323300  TRANSPORTATION                                             10   4   4   1         500
```

INPUT DATA LISTING AND ERROR DIAGNOSTICS

CURRENT CS FILE

```
EQ3233300  NOH(I),OHT,M;I,1,Y                                                    501
CS3234000  SUPPORT & TEST EQUIPMENT MAINTENANCE          10   4    4    1       502
EQ3234000  N(I),STE$,M;I,1,Y                                                    503
CS3235000  FACILITIES                                                           504
CS3235100  SHOP SPACE                                                           505
CS3235110  O/I LEVEL                                     10   3    3    1       506
EQ3235110  MSSI(I),CSI,M;I,1,Y                                                  507
CS3235120  DEPOT LEVEL                                   10   3    3    1       508
EQ3235120  MSSO(I),CSO,M;I,1,Y                                                  509
CS3235200  INVENTORY STORAGE                                                    510
CS3235210  O/I LEVEL                                     10   3    3    1       511
EQ3235210  ISSI(I),CSI,M;I,1,Y                                                  512
CS3235220  DEPOT LEVEL                                   10   3    3    1       513
EQ3235220  ISSO(I),CSO,M;I,1,Y                                                  514
CS3236000  DOCUMENTATION MAINTENANCE                     07   4    4    1       515
EQ3236000  NP.RDM.M;I,IYI.Y                                                     516
CS3237000  SUPPLY SUPPORT                                                       517
CS3237100  REPLENISHMENT SPARES                          06   4    4    1       518
EQ3237100  N(I),OT,M,DC(K),M,QTY(K),M,CST(K),M,DSC(K),M,R(K),FR(I),M,/;         519
EQ3237100  I,1,Y,K,1,NK                                                         520
CS3237200  SUPPLY SYSTEM MANAGEMENT                      06   4    4    1       521
EQ3237200  NSNP,NSN$,+,RIM,M;I,IYI,Y                                            522
CS3238000  TRAINING                                                             523
CS3238100  OPERATOR                                      05   5    4    1       524
EQ3238100  LO(I),RAM,M,CTO,M;I,1,Y                                              525
CS3238200  O/I LEVEL MAINTENANCE                         05   5    4    1       526
EQ3238200  LM(I),RAM,M,CTM,M;I,1,Y                                              527
CS3238300  DEPOT LEVEL MAINTENANCE                       05   4    4    1       528
EQ3238300  LP(I),RAP,M,CTP,M;I,1,Y                                              529
CS3330000  TERMINATION                                   06   4    4    1       530
EQ3330000  NPO(I),TERM,M;I,1,Y                                                  531
ENDCS                                                                           532
```

STATISTICS 89 COST BREAKDOWN STRUCTURE ELEMENTS
752 EQUATION ELEMENTS

NAMES, DESCRIPTIONS, AND DIMENSIONS OF VARIABLES

AD	ACQUISITION COST OF DATA DURING INVESTMENT PERIOD ($/YEAR)
ADC	GOVERNMENT PAYMENTS TO THE CONTRACTOR FOR TECHNICAL AND MANAGERIAL WORK PERFORMED DURING VALIDATION PHASE ($/YEAR)
ADG	GOVERNMENT EXPENDITURES FOR TECHNICAL AND MANAGERIAL WORK PERFORMED DURING VALIDATION PHASE ($/YEAR)
ATU	ACQUISITION, TRANSPORTATION, AND INSTALLATION COSTS OF TRAINING AIDS AND DEVICES DURING INITIAL TRAINING ($/YEAR)
BY	BASE YEAR DURING/FROM WHICH ALL COST ADJUSTMENTS ARE MADE (DIMENSIONLESS)
CE	ENERGY CONSUMPTION COST INCURRED DURING THE OPERATION OF THE PRIME EQUIPMENT ($/HR/EQUIP.)
CIPE	INSTALLATION COST OF THE PRIME EQUIPMENT ($/EQUIP.)
CM	COST OF MATERIALS CONSUMED DURING THE OPERATION OF THE PRIME EQUIPMENT ($/HR/EQUIP.)
CP	AVERAGE COST PER PAGE OF SET-UP, REPRODUCTION AND DISTRIBUTION OF TECHNICAL MANUALS ($/PAGE/COPY)
CS	SOFTWARE MAINTENANCE COST DURING PRIME EQUIPMENT OPERATION ($/YEAR)
CSD	AREA COST FOR DEPOT LEVEL MAINTENANCE ($/SQ. FT./YEAR)
CSI	AREA COST FOR O/I LEVEL MAINTENANCE SPACE ($/SQ. FT./YEAR)
CSO	AREA COST FOR OPERATIONAL SPACE ($/SQ. FT./YEAR)
CST	UNIT COST OF THE KTH SPARE/REPAIR ITEM ($/ITEM)
CTI	AVERAGE INSTRUCTOR TRAINING COST FOR PERSONNEL PAY & ALLOWANCE TRAVEL AND COURSE FEES ($/STUDENT)
CTM	AVERAGE O/I MAINTENANCE PERSONNEL TRAINING COST FOR PAY & ALLOWANCE, TRAVEL AND COURSE FEES ($/STUDENT)
CTO	AVERAGE OPERATING PERSONNEL TRAINING COSTS FOR PAY & ALLOWANCE, TRAVEL AND COURSE FEES ($/STUDENT)
CTP	AVERAGE DEPOT MAINTENANCE PERSONNEL TRAINING COSTS FOR PAY & ALLOWANCE, TRAVEL AND COURSE FEES ($/STUDENT)
CTPE	TRANSPORTATION COST OF PRIME EQUIPMENT FROM CONTRACTORS FACILITY TO INSTALLATION SITE ($/EQUIP.)
CU	UNIT PRICE OF ONE OF THE CONTRACTORS EQUIPMENT ($/EQUIPMENT)
DC	DUTY CYCLE OF THE KTH SPARE/REPAIR ITEM (RATIO)
DCD	PAYMENT BY THE GOVERNMENT TO THE CONTRACTOR FOR ALL THE DATA ACQUIRED DURING FULL SCALE DEVELOPMENT ($/YEAR)
DCE	PAYMENT BY THE GOVERNMENT TO THE CONTRACTOR FOR THE ENGINEERING EFFORTS DURING FULL SCALE DEVELOPMENT ($/YEAR)
DCH	PAYMENT BY THE GOVERNMENT TO THE CONTRACTOR HARDWARE DEVELOPMENT EFFORTS DURING FULL SCALE DEVELOPMENT ($/YEAR)
DCPM	PAYMENT BY THE GOVERNMENT TO THE CONTRACTOR MANAGEMENT EFFORTS DURING FULL SCALE DEVELOPMENT ($/YEAR)
DCS	PAYMENT BY THE GOVERNMENT TO THE CONTRACTOR SOFTWARE DEVELOPMENT EFFORT DURING FULL SCALE DEVELOPMENT ($/YEAR)
DCST	PAYMENT BY THE GOVERNMENT TO THE CONTRACTOR SITE DEVELOPMENT EFFORT DURING FULL SCALE DEVELOPMENT ($/YEAR)
DCTE	PAYMENT BY THE GOVERNMENT TO THE CONTRACTOR TEST&EVALUATION EFFORTS DURING FULL SCALE DEVELOPMENT ($/YEAR)
DGPM	GOVERNMENT PROJECT MANAGEMENT COSTS INCURRED DURING FULL SCALE DEVELOPMENT ($/YEAR)
DGTA	GOVERNMENT COSTS FOR TEST SITE ACTIVATION/DEACTIVATION DURING FULL SCALE DEVELOPMENT T&E PROGRAM ($/YEAR)
DGTE	GOVERNMENT PERSONNEL COSTS INCURRED DURING FULL SCALE DEVELOPMENT T&E PROGRAM FOR TESTING & EVALUATION ($/YEAR)
DGTT	GOVERNMENT COST TO TRAIN STUDENTS DURING FULL SCALE DEVELOPMENT TEST & EVALUATION PROGRAM ($/YEAR)
DR	ANNUAL DISCOUNT RATE FOR FUTURE COSTS (RATIO)
DSC	DISCARD RATE OF THE KTH SPARE/REPAIR ITEM (RATIO)
FDPT	REQUIRED STOCKAGE TIME FOR DEPOT LEVEL REPAIRABLE ITEMS AT O/I AND DEPOT LEVEL (DAYS)
FILS	REQUIRED STOCKAGE TIME FOR REPLENISHMENT SPARES AT O/I LEVEL (DAYS)
FIRT	REPAIR CYCLE TIME OF REPAIRABLE ITEMS AT O/I LEVEL (DAYS)
FM	REPAIR MATERIAL RATE (RATIO)
FMS	MAINTENANCE SITE CONSTRUCTION/PREPARATION COSTS DURING INVESTMENT PERIOD ($/YEAR)
FOS	OPERATIONAL SITE CONSTRUCTION/PREPARATION COSTS DURING INVESTMENT PERIOD ($/YEAR)
FPST	PROCUREMENT LEAD AND SAFETY LEVEL STOCKAGE TIME FOR INITIAL SPARE AND REPAIR PARTS (DAYS)
FR	RELIABILITY IMPROVEMENT OR DEGRADATION FACTOR (DIMENSIONLESS)
IR	MULTIPLIER FOR INFLATION RATES (IRCON, IROM, IRPROC, AND IRRD) FOR SENSITIVITY ANALYSIS
IRCON	ANNUAL INFLATION RATE FOR FUTURE COSTS FOR CONSTRUCTION TYPE OF FUNDING (RATIO)
IROM	ANNUAL INFLATION RATE FOR FUTURE COSTS OF O&M TYPE OF FUNDING (RATIO)
IRPROC	ANNUAL INFLATION RATE FOR FUTURE COSTS OF PROCUREMENT TYPE OF FUNDING (RATIO)
IRRD	ANNUAL INFLATION RATE FOR FUTURE COSTS OF R&D TYPE OF FUNDING (RATIO)
ISSO	STORAGE SPACE REQUIRED FOR THE DEPOT INVENTORY (SQ. FT./YEAR)
ISSI	STORAGE SPACE REQUIRED FOR THE O/I INVENTORY (SQ. FT./YEAR)
IYI	YEAR DURING WHICH INITIAL COST OCCUR (DIMENSIONLESS)
LO	DESIRED MANNING LEVEL FOR OPERATING PERSONNEL (PERSONNEL/YEAR)
LM	DESIRED MANNING LEVEL FOR O/I LEVEL MAINTENANCE PERSONNEL (PERSONNEL/YEAR)

NAMES, DESCRIPTIONS, AND DIMENSIONS OF VARIABLES

LP	DESIRED MANNING LEVEL FOR DEPOT LEVEL MAINTENANCE PERSONNEL (PERSONNEL/YEAR)
LPM	PREVENTIVE MAINTENANCE LABOR TIME FOR NTH MAINTENANCE ACTION (HR/ACTION)
LSD	DEPOT MAINTENANCE LABOR TIME TO REPAIR THE KTH ITEM (HR/ITEM)
LSI	O/I LEVEL MAINTENANCE LABOR TIME TO REPAIR THE KTH ITEM (HR/ITEM)
LSO	O/I LEVEL MAINTENANCE LABOR TIME TO REMOVE AND REPLACE THE KTH ITEM (HR/ITEM)
MPM	MATERIAL COST FOR NTH TYPE OF PREVENTIVE MAINTENANCE ACTION ($/ACTION)
MSSD	SHOP SPACE REQUIRED FOR DEPOT LEVEL MAINTENANCE (SQ. FT./YEAR)
MSSI	SHOP SPACE REQUIRED FOR O/I LEVEL MAINTENANCE (SQ. FT./YEAR)
N	NUMBER OF EQUIPMENTS IN THE NAVY'S INVENTORY SYSTEM (EQUIP./YEAR)
NC	NUMBER OF COPIES OF TECHNICAL DATA TO BE DISTRIBUTED AND INVENTORIED (COPIES/YEAR)
NK	TOTAL NUMBER OF SPARE/REPAIR ITEMS IN THE PRIME EQUIPMENT (DIMENSIONLESS)
NM	TOTAL NUMBER OF PREVENTIVE MAINTENANCE TYPES OF THE PRIME EQUIPMENT (DIMENSIONLESS)
NN	PRIME EQUIPMENT ANNUAL ACCEPTANCE SCHEDULE (EQUIP./YEAR)
NOH	PRIME EQUIPMENT OVERHAUL SCHEDULE (EQUIP./YEAR)
NP	NUMBER OF PAGES PER TECHNICAL MANUAL MAINTAINED BY NAVY (PAGES/COPY)
NPM	TIME BETWEEN INSPECTIONS OF THE PREVENTIVE MAINTENANCE ACTIONS (HR/ACTION)
NPO	PRIME EQUIPMENT PHASE OUT SCHEDULE (EQUIP./YEAR)
NSNP	TOTAL NUMBER OF NEW NATIONAL STOCK NUMBERS TO BE ISSUED ON THE PRIME EQUIPMENT (NSN)
NSNS	TOTAL NUMBER OF NEW NATIONAL STOCK NUMBERS TO BE ISSUED ON THE PECULIAR SITE EQUIPMENTS (NSN)
OHL	PRIME EQUIPMENT OVERHAUL MAINTENANCE LABOR TIME (HR/EQUIP.)
OHM	PRIME EQUIPMENT OVERHAUL MAINTENANCE MATERIAL COST ($/EQUIP.)
OHT	PRIME EQUIPMENT OVERHAUL MAINTENANCE MATERIAL SHIPPING RATE ($/EQUIP.)
OT	PRIME EQUIPMENT ANNUAL OPERATING TIME (HR/YEAR)
PMG	GOVERNMENT PROJECT MANAGEMENT COSTS INCURRED DURING INVESTMENT PERIOD ($/YEAR)
PO	NUMBER OF PERSONNEL REQUIRED TO OPERATE A PRIME EQUIPMENT (PERSONNEL/EQUIP.)
PSOS	FLOOR SPACE REQUIRED FOR THE OPERATION OF A PRIME EQUIPMENT (SQ. FT./EQUIP.)
PSS	PRODUCTION SUPPORT & SERVICES COST INCURRED DURING THE INVESTMENT PERIOD ($/YEAR)
PTE	PRODUCTION TEST & EVALUATION COSTS INCURRED DURING THE INVESTMENT PERIOD ($/YEAR)
PTI	NUMBER OF INSTRUCTORS TO RECEIVE INITIAL TRAINING (STUDENT/YEAR)
PTM	NUMBER OF O/I MAINTENANCE PERSONNEL TO RECEIVE INITIAL TRAINING (STUDENT/YEAR)
PTO	NUMBER OF OPERATING PERSONNEL TO RECEIVE INITIAL TRAINING (STUDENT/YEAR)
PTP	NUMBER OF DEPOT MAINTENANCE PERSONNEL TO RECEIVE INITIAL TRAINING (STUDENT/YEAR)
QTY	NUMBER OF QUANTITIES OF A SPARE/REPAIR ITEM (QUANTITY/ITEM)
R	MEAN TIME BETWEEN FAILURES OF THE SPARE/REPAIR ITEM (HR/ITEM)
RAM	OPERATOR AND O/I LEVEL MAINTENANCE PERSONNEL ATTRITION RATE (RATIO)
RAP	DEPOT LEVEL MAINTENANCE PERSONNEL ATTRITION RATE (RATIO)
RDM	TECHNICAL DATA MANAGEMENT COST PER FILE MAINTENANCE ($/PAGE/YEAR)
RIE	AVERAGE NATIONAL STOCK NUMBER (NSN) ENTRY COST INTO THE SUPPLY SYSTEM ($/NSN)
RIM	SUPPLY SUPPORT MANAGEMENT ITEM RETENTION AND FIELD ADMINISTRATION COST ($/NSN)
RO	PRIME EQUIPMENT OPERATOR HOURLY PAY RATE ($/HR/OPERATOR)
RPL	PACKAGING LABOR COST ($/LB.)
RPM	PACKAGING MATERIAL COST ($/LB.)
RSD	DEPOT MAINTENANCE PERSONNEL PAY RATE TO REPAIR FAILED ITEMS ($/HR/MAN)
RSI	O/I MAINTENANCE PERSONNEL PAY RATE TO REMOVE, REPLACE OR REPAIR FAILED ITEMS ($/HR/MAN)
RSR	AVERAGE SHIPPING COST ($/LB.)
RSS	FRACTION OF FAILURES REPAIRED AT THE INTERMEDIATE MAINTENANCE LEVEL FOR THE KTH ITEM (RATIO)
RW	RATIO OF THE SHIPPING WEIGHT TO THE UNPACKED WEIGHT OF THKTH ITEM (RATIO)
STE	SUPPORT & TEST EQUIPMENT ACQUISITION COST ($/YEAR)
STEM	SUPPORT & TEST EQUIPMENT INITIAL SUPPORT RATE, PERCENT OF STE ACQUISITION COST (RATIO)
STES	SUPPORT & TEST EQUIPMENT RECURRING SUPPORT COST PER PRIME EQUIPMENT ($/EQUIP.)
TERM	TERMINATION COST AND/OR VALUE OF THE PRIME EQUIPMENT ($/EQUIP.)
W	UNPACKED WEIGHT OF THE KTH ITEM (LB./ITEM)

NAMES, DESCRIPTIONS, AND DIMENSIONS OF VARIABLES

Y NUMBER OF YEARS COVERED BY THE LIFE CYCLE ANALYSIS (DIMENSIONLESS)

REMARKS

THIS PROGRAM IS BASED ON COST ALGORITHIMS PROVIDED BY THE NAVAL WEAPONS ENGINEERING SUPPORT ACTIVITY MANAGEMENT ENGINEERING DEPARTMENT COST MANAGEMENT DIVISION.

CN CARD DESCRIPTION

COLUMN	DESCRIPTION
1-2	CARD TYPE 'CN'
3	EQUATION
4	REMARKS
5	DICTIONARY
6	VARIABLE VALUES
7	COST ADJUSTMENT FACTORS
8	NOT USED
9	SUMMARY
10	FUNDING BY COST CATEGORY
11	COST BREAKDOWN BY YEAR
12	COST BREAKDOWN TOTALS
13	GENERAL FUNDING
14	ANNUAL COST BY FUNDING
15	ANNUAL COST BY COST CATEGORIES
16	SENSITIVITY ANALYISIS
20	INFLATION RATE/FACTOR INPUT OPTION (BLANK OR 0 RATE, 1 FACTOR)

CS CARD DESCRIPTION

COLUMN	DESCRIPTION
1-2	CARD TYPE "CS"
3-8	COST BREAKDOWN STRUCTURE NUMBER
11-50	COST ELEMENT DESCRIPTION
55-56	COST CATEGORY
60	FUNDING TYPE
65	INFLATION FACTOR TYPE
70	EQUATION CODE
73-78	DELETE

EQ CARD DESCRIPTION

COLUMN	DESCRIPTION
1-2	CARD TYPE "EQ"
3-8	COST BREAKDOWN STRUCTURE NUMBER
11-80	COST EQUATION

DS CARD DESCRIPTION

REMARKS

COLUMN	DESCRIPTION
1-2	CARD TYPE "OS"
5-13	VARIABLE NAME
16-72	VARIABLE *DESCRIPTION*

NV CARD DESCRIPTION

COLUMN	DESCRIPTION
1-2	CARD TYPE "NV"
5-13	VARIABLE NAME
16-80	VARIABLE VALUE (IF VALUES CONTINUED END WITH A COMMA)

SA (SENSITIVITY ANALYISIS) CARD DESCRIPTION

COLUMN	DESCRIPTION
1-2	CARD TYPE "SA"
10-17	VARIABLE NAME
20-29	LOWER VALUE
30-39	UPPER VALUE
40-49	ROW SELECTION
50-59	COLUMN SELECTION

M M M INPUT DATA - SCALARS M M M

NAME		DESCRIPTION
BY	1.00	BASE YEAR DURING/FROM WHICH ALL COST ADJUSTMENTS ARE MADE (DIMENSIONLESS)
NOCAT	10.00	
Y	5.00	NUMBER OF YEARS COVERED BY THE LIFE CYCLE ANALYSIS (DIMENSIONLESS)
NK	15.00	TOTAL NUMBER OF SPARE/REPAIR ITEMS IN THE PRIME EQUIPMENT (DIMENSIONLESS)
NM	2.00	TOTAL NUMBER OF PREVENTIVE MAINTENANCE TYPES OF THE PRIME EQUIPMENT (DIMENSIONLESS)
CE	2.00	ENERGY CONSUMPTION COST INCURRED DURING THE OPERATION OF THE PRIME EQUIPMENT ($/HR/EQUIP.)
CIPE	1,500.00	INSTALLATION COST OF THE PRIME EQUIPMENT ($/EQUIP.)
CM	0.50	COST OF MATERIALS CONSUMED DURING THE OPERATION OF THE PRIME EQUIPMENT ($/HR/EQUIP.)
CP	0.05	AVERAGE COST PER PAGE OF SET-UP, REPRODUCTION AND DISTRIBUTION OF TECHNICAL MANUALS ($/PAGE/COPY)
CSD	2.40	AREA COST FOR DEPOT LEVEL MAINTENANCE ($/SQ. FT./YEAR)
CSI	240.00	AREA COST FOR O/I LEVEL MAINTENANCE SPACE ($/SQ. FT./YEAR)
CSO	240.00	AREA COST FOR OPERATIONAL SPACE ($/SQ. FT./YEAR)
CTI	1,000.00	AVERAGE INSTRUCTOR TRAINING COST FOR PERSONNEL PAY & ALLOWANCE TRAVEL AND COURSE FEES ($/STUDENT)
CTM	750.00	AVERAGE O/I MAINTENANCE PERSONNEL TRAINING COST FOR PAY & ALLOWANCE, TRAVEL AND COURSE FEES ($/STUDENT)
CTO	500.00	AVERAGE OPERATING PERSONNEL TRAINING COSTS FOR PAY & ALLOWANCE, TRAVEL AND COURSE FEES ($/STUDENT)
CTP	1,000.00	AVERAGE DEPOT MAINTENANCE PERSONNEL TRAINING COSTS FOR PAY & ALLOWANCE, TRAVEL AND COURSE FEES ($/STUDENT)

* * * INPUT DATA - SCALARS * * *

NAME		DESCRIPTION
CTPE	600.00	TRANSPORTATION COST OF PRIME EQUIPMENT FROM CONTRACTORS FACILITY TO INSTALLATION SITE ($/EQUIP.)
CU	50,000.00	UNIT PRICE OF ONE OF THE CONTRACTORS EQUIPMENT ($/EQUIPMENT)
FDRT	117.00	REQUIRED STOCKAGE TIME FOR DEPOT LEVEL REPAIRABLE ITEMS AT O/I AND DEPOT LEVEL (DAYS)
FILS	90.00	REQUIRED STOCKAGE TIME FOR REPLENISHMENT SPARES AT O/I LEVEL (DAYS)
FIRT	3.00	REPAIR CYCLE TIME OF REPAIRABLE ITEMS AT O/I LEVEL (DAYS)
FM	0.12	REPAIR MATERIAL RATE (RATIO)
FPST	411.00	PROCUREMENT LEAD AND SAFETY LEVEL STOCKAGE TIME FOR INITIAL SPARE AND REPAIR PARTS (DAYS)
IYI	2.00	YEAR DURING WHICH INITIAL COST OCCUR (DIMENSIONLESS)
NP	200.00	NUMBER OF PAGES PER TECHNICAL MANUAL MAINTAINED BY NAVY (PAGES/COPY)
NSNP	75.00	TOTAL NUMBER OF NEW NATIONAL STOCK NUMBERS TO BE ISSUED ON THE PRIME EQUIPMENT (NSN)
NSNS	350.00	TOTAL NUMBER OF NEW NATIONAL STOCK NUMBERS TO BE ISSUED ON THE PECULIAR SSTE EQUIPMENTS (NSN)
OHL	120.00	PRIME EQUIPMENT OVERHAUL MAINTENANCE LABOR TIME (HR/EQUIP.)
OHM	1,500.00	PRIME EQUIPMENT OVERHAUL MAINTENANCE MATERIAL COST ($/EQUIP.)
OHT	500.00	PRIME EQUIPMENT OVERHAUL MAINTENANCE MATERIAL SHIPPING RATE ($/EQUIP.)
OT	1,600.00	PRIME EQUIPMENT ANNUAL OPERATING TIME (HR/YEAR)
PO	1.00	NUMBER OF PERSONNEL REQUIRED TO OPERATE A PRIME EQUIPMENT (PERSONNEL/EQUIP.)

* * * INPUT DATA - SCALARS * * *

NAME		DESCRIPTION
PSOS	50.00	FLOOR SPACE REQUIRED FOR THE OPERATION OF A PRIME EQUIPMENT (SQ. FT./EQUIP.)
RAM	0.40	OPERATOR AND O/I LEVEL MAINTENANCE PERSONNEL ATTRITION RATE (RATIO)
RAP	0.13	DEPOT LEVEL MAINTENANCE PERSONNEL ATTRITION RATE (RATIO)
RDM	100.00	TECHNICAL DATA MANAGEMENT COST FOR FILE MAINTENANCE ($/PAGE/YEAR)
RIE	100.00	AVERAGE NATIONAL STOCK NUMBER (NSN) ENTRY COST INTO THE SUPPLY SYSTEM ($/NSN)
RIM	100.00	SUPPLY SUPPORT MANAGEMENT ITEM RETENTION AND FIELD ADMINISTRATION COST ($/NSN)
RO	7.87	PRIME EQUIPMENT OPERATOR HOURLY PAY RATE ($/HR/OPERATOR)
RPL	1.00	PACKAGING LABOR COST ($/LB.)
RPM	0.50	PACKAGING MATERIAL COST ($/LB.)
RSD	17.22	DEPOT MAINTENANCE PERSONNEL PAY RATE TO REPAIR FAILED ITEMS ($/HR/MAN)
RSL	7.87	O/I MAINTENANCE PERSONNEL PAY RATE TO REMOVE, REPLACE OR REPAIR FAILED ITEMS ($/HR/MAN)
RSR	0.10	AVERAGE SHIPPING COST ($/LB.)
STEM	0.25	SUPPORT & TEST EQUIPMENT INITIAL SUPPORT RATE, PERCENT OF SATE ACQUISITION COST (RATIO)
STES	5,000.00	SUPPORT & TEST EQUIPMENT RECURRING SUPPORT COST PER PRIME EQUIPMENT ($/EQUIP.)
TERM	1,200.00	TERMINATION COST AND/OR VALUE OF THE PRIME EQUIPMENT ($/EQUIP.)

* * * INPUT DATA - ARRAYS * * *

NAME		DESCRIPTION								
DR	(5)	ANNUAL DISCOUNT RATE FOR FUTURE COSTS (RATIO)								
	0.10	0.10	0.10	0.10	0.10					
IRRD	(5)	ANNUAL INFLATION RATE FOR FUTURE COSTS OF R&D TYPE OF FUNDING (RATIO)								
	0.05	0.05	0.05	0.05	0.05					
IRPROC	(5)	ANNUAL INFLATION RATE FOR FUTURE COSTS OF PROCUREMENT TYPE OF FUNDING (RATIO)								
	0.06	0.06	0.06	0.06	0.06					
IRCON	(5)	ANNUAL INFLATION RATE FOR FUTURE COSTS FOR CONSTRUCTION TYPE OF FUNDING (RATIO)								
	0.06	0.06	0.06	0.06	0.06					
IROM	(5)	ANNUAL INFLATION RATE FOR FUTURE COSTS OF O&M TYPE OF FUNDING (RATIO)								
	0.07	0.07	0.07	0.07	0.07					
AD	(5)	ACQUISITION COST OF DATA DURING INVESTMENT PERIOD ($/YEAR)								
	300,000.00	0.00	0.00	0.00	0.00					
ADC	(5)	GOVERNMENT PAYMENTS TO THE CONTRACTOR FOR TECHNICAL AND MANAGERIAL WORK PERFORMED DURING VALIDATION PHASE ($/YEAR)								
	500,000.00	0.00	0.00	0.00	0.00					
ADG	(5)	GOVERNMENT EXPENDITURES FOR TECHNICAL AND MANAGERIAL WORK PERFORMED DURING VALIDATION PHASE ($/YEAR)								
	250,000.00	0.00	0.00	0.00	0.00					
ATU	(5)	ACQUISITION, TRANSPORTATION, AND INSTALLATION COSTS OF TRAINING AIDS AND DEVICES DURING INITIAL TRAINING ($/YEAR)								
	50,000.00	0.00	0.00	0.00	0.00					
CS	(5)	SOFTWARE MAINTENANCE COST DURING PRIME EQUIPMENT OPERATION ($/YEAR)								
	0.00	0.00	15,000.00	15,000.00	15,000.00					
CST	(15)	UNIT COST OF THE KTH SPARE/REPAIR ITEM ($/ITEM)								
	750.00	1,200.00	5,000.00	4,200.00	1,700.00	3,500.00	3,500.00	9,000.00	500.00	500.00
	500.00	500.00	2,500.00	2,500.00	6,000.00					
DC	(15)	DUTY CYCLE OF THE KTH SPARE/REPAIR ITEM (RATIO)								
	0.75	0.75	0.75	0.75	1.00	0.75	0.75	0.75	1.00	1.00
	1.00	1.00	1.00	1.00	1.00					
DCD	(5)	PAYMENT BY THE GOVERNMENT TO THE CONTRACTOR FOR ALL THE DATA ACQUIRED DURING FULL SCALE DEVELOPMENT ($/YEAR)								
	150,000.00	0.00	0.00	0.00	0.00					
DCE	(5)	PAYMENT BY THE GOVERNMENT TO THE CONTRACTOR FOR THE ENGINEERING EFFORTS DURING FULL SCALE DEVELOPMENT ($/YEAR)								
	300,000.00	0.00	0.00	0.00	0.00					
DCH	(5)	PAYMENT BY THE GOVERNMENT TO THE CONTRACTOR HARDWARE DEVELOPMENT EFFORTS DURING FULL SCALE DEVELOPMENT ($/YEAR)								
	600,000.00	0.00	0.00	0.00	0.00					
DCPM	(5)	PAYMENT BY THE GOVERNMENT TO THE CONTRACTOR MANAGEMENT EFFORTS DURING FULL SCALE DEVELOPMENT ($/YEAR)								
	200,000.00	0.00	0.00	0.00	0.00					

* READ ARRAY VALUES FROM LEFT TO RIGHT *

* * * INPUT DATA - ARRAYS * * *

NAME		DESCRIPTION								
CS	(5)	PAYMENT BY THE GOVERNMENT TO THE CONTRACTOR SOFTWARE DEVELOPMENT EFFORT DURING FULL SCALE DEVELOPMENT ($/YEAR)								
	150,000.00	0.00	0.00	0.00	0.00					
DCST	(5)	PAYMENT BY THE GOVERNMENT TO THE CONTRACTOR SATE DEVELOPMENT EFFORT DURING FULL SCALE DEVELOPMENT ($/YEAR)								
	350,000.00	0.00	0.00	0.00	0.00					
DCTE	(5)	PAYMENT BY THE GOVERNMENT TO THE CONTRACTOR TEST&EVALUATION EFFORTS DURING FULL SCALE DEVELOPMENT ($/YEAR)								
	75,000.00	0.00	0.00	0.00	0.00					
DGPM	(5)	GOVERNMENT PROJECT MANAGEMENT COSTS INCURRED DURING FULL SCALE DEVELOPMENT ($/YEAR)								
	550,000.00	0.00	0.00	0.00	0.00					
DGTA	(5)	GOVERNMENT COSTS FOR TEST SITE ACTIVATION/DEACTIVATION DURING FULL SCALE DEVELOPMENT T&E PROGRAM ($/YEAR)								
	50,000.00	0.00	0.00	0.00	0.00					
DGTE	(5)	GOVERNMENT PERSONNEL COSTS INCURRED DURING FULL SCALE DEVELOPMENT T&E PROGRAM FOR TESTING & EVALUATION ($/YEAR)								
	275,000.00	0.00	0.00	0.00	0.00					
DGTT	(5)	GOVERNMENT COST TO TRAIN STUDENTS DURING FULL SCALE DEVELOPMENT TEST & EVALUATION PROGRAM ($/YEAR)								
	10,000.00	0.00	0.00	0.00	0.00					
DSC	(15)	DISCARD RATE OF THE KTH SPARE/REPAIR ITEM (RATIO)								
	1.00	0.20	0.10	0.10	0.00	0.10	0.00	0.10	0.10	0.10
	0.10	0.10	0.10	0.10	0.10					
FMS	(5)	MAINTENANCE SITE CONSTRUCTION/PREPARATION COSTS DURING INVESTMENT PERIOD ($/YEAR)								
	0.00	400,000.00	200,000.00	0.00	0.00					
FOS	(5)	OPERATIONAL SITE CONSTRUCTION/PREPARATION COSTS DURING INVESTMENT PERIOD ($/YEAR)								
	0.00	150,000.00	75,000.00	0.00	0.00					
FR	(5)	RELIABILITY IMPROVEMENT OR DEGRIDATION FACTOR (DIMENSIONLESS)								
	1.00	1.00	1.00	0.90	0.75					
ISSD	(5)	STORAGE SPACE REQUIRED FOR THE DEPOT INVENTORY (SQ. FT./YEAR)								
	0.00	250.00	250.00	250.00	250.00					
ISSI	(5)	STORAGE SPACE REQUIRED FOR THE O/I INVENTORY (SQ. FT./YEAR)								
	0.00	1,000.00	1,000.00	1,000.00	1,000.00					
LO	(5)	DESIRED MANNING LEVEL FOR OPERATING PERSONNEL (PERSONNEL/YEAR)								
	0.00	0.00	80.00	100.00	100.00					
LM	(5)	DESIRED MANNING LEVEL FOR O/I LEVEL MAINTENANCE PERSONNEL (PERSONNEL/YEAR)								
	0.00	0.00	80.00	100.00	100.00					
LP	(5)	DESIRED MANNING LEVEL FOR DEPOT LEVEL MAINTENANCE PERSONNEL (PERSONNEL/YEAR)								
	0.00	0.00	10.00	10.00	10.00					

* READ ARRAY VALUES FROM LEFT TO RIGHT *

* * * INPUT DATA - ARRAYS * * *

NAME		DESCRIPTION								
LPM	(2)	PREVENTIVE MAINTENANCE LABOR TIME FOR NTH MAINTENANCE ACTION (HR/ACTION)								
	6.00	15.00								
LSD	(15)	DEPOT MAINTENANCE LABOR TIME TO REPAIR THE KTH ITEM (HR/ITEM)								
	0.00	7.00	15.00	6.00	0.00	9.00	6.00	20.00	5.00	5.00
	5.00	5.00	10.00	5.00	15.00					
LSI	(15)	O/I LEVEL MAINTENANCE LABOR TIME TO REPAIR THE KTH ITEM (HR/ITEM)								
	0.00	5.00	12.00	4.00	8.00	6.00	5.00	15.00	3.00	3.00
	3.00	3.00	7.00	3.00	11.00					
LSO	(15)	O/I LEVEL MAINTENANCE LABOR TIME TO REMOVE AND REPLACE THE KTH ITEM (HR/ITEM)								
	3.00	2.00	1.80	2.60	4.00	3.00	3.00	4.00	2.00	2.00
	2.00	2.00	4.00	1.00	3.00					
MPM	(2)	MATERIAL COST FOR NTH TYPE OF PREVENTIVE MAINTENANCE ACTION ($/ACTION)								
	50.00	150.00								
MSSD	(5)	SHOP SPACE REQUIRED FOR DEPOT LEVEL MAINTENANCE (SQ. FT./YEAR)								
	0.00	150.00	150.00	150.00	150.00					
MSSI	(5)	SHOP SPACE REQUIRED FOR O/I LEVEL MAINTENANCE (SQ. FT./YEAR)								
	0.00	1,000.00	1,000.00	1,000.00	1,000.00					
N	(5)	NUMBER OF EQUIPMENTS IN THE NAVY'S INVENTORY SYSTEM (EQUIP./YEAR)								
	0.00	0.00	80.00	100.00	100.00					
NC	(5)	NUMBER OF COPIES OF TECHNICAL DATA TO BE DISTRIBUTED AND INVENTORIED (COPIES/YEAR)								
	0.00	25.00	0.00	0.00	0.00					
NN	(5)	PRIME EQUIPMENT ANNUAL ACCEPTANCE SCHEDULE (EQUIP./YEAR)								
	0.00	50.00	30.00	20.00	0.00					
NOH	(5)	PRIME EQUIPMENT OVERHAUL SCHEDULE (EQUIP./YEAR)								
	0.00	0.00	0.00	0.00	80.00					
NPM	(2)	TIME BETWEEN INSPECTIONS OF THE PREVENTIVE MAINTENANCE ACTIONS (HR/ACTION)								
	100.00	600.00								
NPO	(5)	PRIME EQUIPMENT PHASE OUT SCHEDULE (EQUIP./YEAR)								
	0.00	0.00	0.00	0.00	15.00					
PMG	(5)	GOVERNMENT PROJECT MANAGEMENT COSTS INCURRED DURING INVESTMENT PERIOD ($/YEAR)								
	0.00	650,000.00	270,000.00	0.00	0.00					
PSS	(5)	PRODUCTION SUPPORT & SERVICES COST INCURRED DURING THE INVESTMENT PERIOD ($/YEAR)								
	0.00	350,000.00	0.00	0.00	0.00					

* READ ARRAY VALUES FROM LEFT TO RIGHT *

* * * INPUT DATA - ARRAYS * * *

NAME		DESCRIPTION								
PTE	(5)	PRODUCTION TEST & EVALUATION COSTS INCURRED DURING THE INVESTMENT PERIOD ($/YEAR)								
	0.00	50,000.00	0.00	0.00	0.00					
PTI	(5)	NUMBER OF INSTRUCTORS TO RECEIVE INITIAL TRAINING (STUDENT/YEAR)								
	0.00	15.00	0.00	0.00	0.00					
PTM	(5)	NUMBER OF O/I MAINTENANCE PERSONNEL TO RECEIVE INITIAL TRAINING (STUDENT/YEAR)								
	0.00	50.00	30.00	20.00	0.00					
PTO	(5)	NUMBER OF OPERATING PERSONNEL TO RECEIVE INITIAL TRAINING (STUDENT/YEAR)								
	0.00	50.00	30.00	20.00	0.00					
PTP	(5)	NUMBER OF DEPOT MAINTENANCE PERSONNEL TO RECEIVE INITIAL TRAINING (STUDENT/YEAR)								
	0.00	10.00	0.00	0.00	0.00					
QTY	(15)	NUMBER OF QUANTITIES OF A SPARE/REPAIR ITEM (QUANTITY/ITEM)								
	2.00	4.00	1.00	3.00	6.00	1.00	2.00	1.00	2.00	2.00
	2.00	2.00	1.00	1.00	1.00					
R	(15)	MEAN TIME BETWEEN FAILURES OF THE SPARE/REPAIR ITEM (HR/ITEM)								
	750.00	500.00	870.00	600.00	250.00	400.00	600.00	900.00	350.00	350.00
	350.00	350.00	700.00	1,200.00	1,500.00					
RSS	(15)	FRACTION OF FAILURES REPAIRED AT THE INTERMEDIATE MAINTENANCE LEVEL FOR THE KTH ITEM (RATIO)								
	1.00	0.80	0.70	0.50	1.00	0.80	0.60	0.90	0.85	0.85
	0.85	0.65	0.50	0.70	0.40					
RW	(15)	RATIO OF THE SHIPPING WEIGHT TO THE UNPACKED WEIGHT OF THKTH ITEM (RATIO)								
	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
	1.25	1.25	1.25	1.25	1.25					
STE	(5)	SUPPORT & TEST EQUIPMENT ACQUISITION COST ($/YEAR)								
	500,000.00	0.00	0.00	0.00	0.00					
W	(15)	UNPACKED WEIGHT OF THE KTH ITEM (LB./ITEM)								
	75.00	100.00	170.00	300.00	250.00	190.00	300.00	50.00	600.00	450.00
	275.00	310.00	140.00	260.00	700.00					

* READ ARRAY VALUES FROM LEFT TO RIGHT *

COST ADJUSTMENT FACTORS

YEAR	INFLATION FACTORS				INFLATION AND DISCOUNT FACTORS				DISCOUNT FACTORS
	R & D	PROCUREMENT	CONSTRUCTION	O & M	R & D	PROCUREMENT	CONSTRUCTION	O & M	
1	1.050	1.060	1.035	1.070	0.955	0.964	0.959	0.973	0.909
2	1.102	1.124	1.113	1.145	0.911	0.929	0.920	0.946	0.826
3	1.158	1.191	1.174	1.225	0.870	0.895	0.882	0.920	0.751
4	1.216	1.262	1.239	1.311	0.830	0.862	0.846	0.895	0.683
5	1.276	1.338	1.307	1.403	0.792	0.831	0.812	0.871	0.621

*********** MILITARY PERSONNEL FUNDING USES THE SAME COST ADJUSTMENT FACTORS AS O&M ***********

SUMMARY

$$$ COSTS IN DOLLARS $$$ ******BASE YEAR= 1 ,CONSTANT DOLLARS******

COST CATEGORY	COST ELEMENT - DEVELOPMENT	INVESTMENT	O&S	COST CATEGORY TOTAL
CONTRACTOR	2,825,000	0	0	2,825,000
% OF COST CATEGORY TOTAL	100.0	0.0	0.0	100.0
% OF COST ELEMENT TOTAL	71.3	0.0	0.0	6.1
PROGRAM MANAGEMENT	800,000	920,000	0	1,720,000
% OF COST CATEGORY TOTAL	46.5	53.5	0.0	100.0
% OF COST ELEMENT TOTAL	20.2	7.9	0.0	3.7
TESTING	325,000	50,000	0	375,000
% OF COST CATEGORY TOTAL	86.7	13.3	0.0	100.0
% OF COST ELEMENT TOTAL	8.2	0.4	0.0	0.8
PRIME EQUIPMENT	0	5,360,000	0	5,360,000
% OF COST CATEGORY TOTAL	0.0	100.0	0.0	100.0
% OF COST ELEMENT TOTAL	0.0	47.9	0.0	12.0
TRAINING	10,000	200,000	143,900	353,900
% OF COST CATEGORY TOTAL	2.8	56.5	40.7	100.0
% OF COST ELEMENT TOTAL	0.3	1.7	0.5	0.8
SUPPLY SUPPORT	0	3,261,974	4,579,999	7,841,973
% OF COST CATEGORY TOTAL	0.0	41.6	58.4	100.0
% OF COST ELEMENT TOTAL	0.0	28.1	14.8	16.9
TECHNICAL DATA	0	300,250	80,000	380,250
% OF COST CATEGORY TOTAL	0.0	79.0	21.0	100.0
% OF COST ELEMENT TOTAL	0.0	2.6	0.3	0.8
SUPPORT EQUIPMENT	0	500,000	0	500,000
% OF COST CATEGORY TOTAL	0.0	100.0	0.0	100.0
% OF COST ELEMENT TOTAL	0.0	4.3	0.0	1.1
OPERATION	0	225,000	8,050,758	8,275,758
% OF COST CATEGORY TOTAL	0.0	2.7	97.3	100.0
% OF COST ELEMENT TOTAL	0.0	1.9	26.1	17.8
MAINTENANCE	0	600,000	18,025,644	18,625,644
% OF COST CATEGORY TOTAL	0.0	3.2	96.8	100.0
% OF COST ELEMENT TOTAL	0.0	5.2	58.4	40.1
COST ELEMENT TOTAL	3,960,000	11,617,224	30,880,301	46,457,525
% OF LIFE CYCLE COST	8.5	25.0	66.5	100.0

FUNDING VS. COST CATEGORY

$$$ COSTS IN DOLLARS $$$ ######BASE YEAR= 1 ,CONSTANT DOLLARS######

COST CATEGORY	FUNDING TYPE R & D	PROCUREMENT	CONSTRUCTION	O & M	MIL. PERSONNEL	OTHERS	COST CATEGORY TOTAL
CONTRACTOR	2,825,000	0	0	0	0	0	2,825,000
% OF COST CATEGORY TOTAL	100.0	0.0	0.0	0.0	0.0	0.0	100.0
% OF FUNDING TYPE TOTAL	72.4	0.0	0.0	0.0	0.0	0.0	6.1
PROGRAM MANAGEMENT	800,000	920,000	0	0	0	0	1,720,000
% OF COST CATEGORY TOTAL	46.5	53.5	0.0	0.0	0.0	0.0	100.0
% OF FUNDING TYPE TOTAL	20.5	8.7	0.0	0.0	0.0	0.0	3.7
TESTING	275,000	50,000	50,000	0	0	0	375,000
% OF COST CATEGORY TOTAL	73.3	13.3	13.3	0.0	0.0	0.0	100.0
% OF FUNDING TYPE TOTAL	7.1	0.5	0.8	0.0	0.0	0.0	0.8
PRIME EQUIPMENT	0	5,560,000	0	0	0	0	5,560,000
% OF COST CATEGORY TOTAL	0.0	100.0	0.0	0.0	0.0	0.0	100.0
% OF FUNDING TYPE TOTAL	0.0	52.5	0.0	0.0	0.0	0.0	12.0
TRAINING		50,000	0	13,900	290,000	0	353,900
% OF COST CATEGORY TOTAL	0.0	14.1	0.0	3.9	81.9	0.0	100.0
% OF FUNDING TYPE TOTAL	0.0	0.5	0.0	0.1	4.6	0.0	0.8
SUPPLY SUPPORT	0	3,219,476	0	4,622,499	0	0	7,841,973
% OF COST CATEGORY TOTAL	0.0	41.1	0.0	58.9	0.0	0.0	100.0
% OF FUNDING TYPE TOTAL	0.0	30.4	0.0	23.7	0.0	0.0	16.9
TECHNICAL DATA	0	300,250	0	80,000	0	0	380,250
% OF COST CATEGORY TOTAL	0.0	79.0	0.0	21.0	0.0	0.0	100.0
% OF FUNDING TYPE TOTAL	0.0	2.8	0.0	0.4	0.0	0.0	0.8
SUPPORT EQUIPMENT	0	500,000	0	0	0	0	500,000
% OF COST CATEGORY TOTAL	0.0	100.0	0.0	0.0	0.0	0.0	100.0
% OF FUNDING TYPE TOTAL	0.0	4.7	0.0	0.0	0.0	0.0	1.1
OPERATION	0	0	3,585,000	1,165,000	3,525,758	0	8,275,758
% OF COST CATEGORY TOTAL	0.0	0.0	43.3	14.1	42.6	0.0	100.0
% OF FUNDING TYPE TOTAL	0.0	0.0	58.2	6.0	56.3	0.0	17.8
MAINTENANCE	0	0	2,523,840	13,658,721	2,443,083	0	18,625,644
% OF COST CATEGORY TOTAL	0.0	0.0	13.6	73.3	13.1	0.0	100.0
% OF FUNDING TYPE TOTAL	0.0	0.0	41.0	69.9	39.0	0.0	40.1
FUNDING TYPE TOTAL	3,900,000	10,599,724	6,158,840	19,540,120	6,258,841	0	46,457,525
% OF LIFE CYCLE COST	8.4	22.8	13.3	42.1	13.5	0.0	100.0

COST BREAKDOWN BY YEAR

$$$ COSTS IN DOLLARS $$$ ******BASE YEAR= 1 ,CONSTANT DOLLARS******

COST BREAKDOWN STRUCTURE NUMBER	COST BREAKDOWN STRUCTURE ELEMENT	COST FOR YEAR 1	2	3	4	5
000000	TOTAL LIFE CYCLE	4,935,000	6,392,311	10,996,268	12,146,602	11,987,344
100000	RESEARCH AND DEVELOPMENT	3,960,000	0	0	0	0
110000	VALIDATION	750,000	0	0	0	0
111000	CONTRACTOR	500,000	0	0	0	0
112000	GOVERNMENT	250,000	0	0	0	0
120000	FULL SCALE DEVELOPMENT	3,210,000	0	0	0	0
121000	CONTRACTOR	2,325,000	0	0	0	0
121100	MANAGEMENT	200,000	0	0	0	0
121200	ENGINEERING	800,000	0	0	0	0
121300	PROTOTYPE HARDWARE	600,000	0	0	0	0
121400	SOFTWARE	150,000	0	0	0	0
121500	TEST AND EVALUATION	75,000	0	0	0	0
121600	DOCUMENTATION	150,000	0	0	0	0
121700	SUPPORT AND TEST EQUIPMENT	350,000	0	0	0	0
122000	GOVERNMENT	885,000	0	0	0	0
122100	PROGRAM MANAGEMENT	550,000	0	0	0	0
122200	PROTOTYPE TEST AND EVALUATION	335,000	0	0	0	0
122210	TRAINING	10,000	0	0	0	0
122220	TEST SITE ACTIVATION	50,000	0	0	0	0
122230	TEST AND EVALUATION	275,000	0	0	0	0
200000	INVESTMENT	975,000	5,848,851	3,053,661	1,739,712	0
210000	GOVERNMENT PROGRAM MANAGEMENT	0	650,000	270,000	0	0
220000	PRIME EQUIPMENT ACQUISITION	0	3,005,000	1,563,000	1,042,000	0
221000	PRODUCTION HARDWARE	0	2,500,000	1,500,000	1,000,000	0
222000	PRODUCTION SUPPORT AND SERVICES	0	350,000	0	0	0
223000	PRODUCTION TEST AND EVALUATION	0	50,000	0	0	0
224000	TRANSPORTATION	0	30,000	18,000	12,000	0
225000	INSTALLATION AND CHECKOUT	0	75,000	45,000	30,000	0
230000	INITIAL SUPPORT ACQUISITION	975,000	2,193,851	1,220,661	697,712	0
231000	SUPPORT AND TEST EQUIPMENT ACQUISITION	500,000	0	0	0	0
232000	SUPPLY SUPPORT	125,000	1,556,101	908,161	672,712	0
232100	INITIAL SPARES	125,000	1,513,601	908,161	672,712	0
232110	PRIME EQUIPMENT	0	1,513,601	908,161	672,712	0
232120	SUPPORT AND TEST EQUIPMENT	125,000	0	0	0	0
232200	NEW NSN ENTRY INTO THE SUPPLY SYSTEM	0	42,500	0	0	0
233000	FACILITIES	0	550,000	275,000	0	0
233100	OPERATIONAL	0	150,000	75,000	0	0
233200	MAINTENANCE	0	400,000	200,000	0	0
234000	DOCUMENTATION	300,000	250	0	0	0
234100	ACQUISITION	300,000	0	0	0	0
234200	REPRODUCTION AND DISTRIBUTION	0	250	0	0	0
235000	TRAINING	50,000	67,500	37,500	25,000	0
235100	OPERATOR	0	25,000	15,000	10,000	0
235200	O/I LEVEL MAINTENANCE	0	37,500	22,500	15,000	0

COST BREAKDOWN BY YEAR

$$$ COSTS IN DOLLARS $$$ %%%%%BASE YEAR= 1 ,CONSTANT DOLLARS%%%%%

COST BREAKDOWN STRUCTURE NUMBER	COST BREAKDOWN STRUCTURE ELEMENT	COST FOR YEAR 1	2	3	4	5
235300	DEPOT LEVEL MAINTENANCE	0	10,000	0	0	0
235400	INSTRUCTOR	0	15,000	0	0	0
235500	TRAINING AIDS	50,000	0	0	0	0
300000	OPERATING AND SUPPORT	0	543,460	7,942,607	10,406,890	11,987,344
310000	OPERATION	0	0	2,302,360	2,874,199	2,874,199
311000	PERSONNEL	0	0	1,007,360	1,259,199	1,259,199
312000	FACILITIES	0	0	960,000	1,200,000	1,200,000
313000	ENERGY CONSUMPTION	0	0	256,000	320,000	320,000
314000	MATERIAL CONSUMPTION	0	0	64,000	80,000	80,000
315000	SOFTWARE MAINTENANCE	0	0	15,000	15,000	15,000
320000	SUPPORT	0	543,460	5,640,247	7,532,691	9,095,145
321000	CORRECTIVE MAINTENANCE	0	0	3,370,755	4,681,606	5,617,927
321100	LABOR	0	0	643,269	893,430	1,072,116
321110	O/I LEVEL (REMOVE & REPLACE)	0	0	197,465	274,257	329,108
321120	O/I LEVEL (REPAIR)	0	0	313,656	435,633	522,760
321130	DEPOT LEVEL (REPAIR)	0	0	132,149	183,540	220,248
321200	REPAIR MATERIAL	0	0	1,612,731	2,239,905	2,687,886
321300	TRANSPORTATION AND PACKAGING	0	0	1,114,755	1,548,271	1,857,925
321310	MATERIAL HANDLING LABOR	0	0	683,899	949,859	1,139,831
321320	PACKAGING MATERIAL	0	0	341,949	474,930	569,916
321330	SHIPPING	0	0	88,907	123,482	148,178
322000	PREVENTIVE MAINTENANCE	0	0	201,773	252,216	252,216
322100	LABOR	0	0	105,773	132,216	132,216
322200	MATERIAL	0	0	96,000	120,000	120,000
323000	OVERHAUL	0	0	0	0	325,312
323100	LABOR	0	0	0	0	165,312
323200	MATERIAL	0	0	0	0	120,000
323300	TRANSPORTATION	0	0	0	0	40,000
324000	SUPPORT & TEST EQUIPMENT MAINTENANCE	0	0	400,000	500,000	500,000
325000	FACILITIES	0	480,960	480,960	480,960	480,960
325100	SHOP SPACE	0	240,360	240,360	240,360	240,360
325110	O/I LEVEL	0	240,000	240,000	240,000	240,000
325120	DEPOT LEVEL	0	360	360	360	360
325200	INVENTORY STORAGE	0	240,600	240,600	240,600	240,600
325210	O/I LEVEL	0	240,000	240,000	240,000	240,000
325220	DEPOT LEVEL	0	600	600	600	600
326000	DOCUMENTATION MAINTENANCE	0	20,000	20,000	20,000	20,000
327000	SUPPLY SUPPORT	0	42,500	1,125,459	1,546,609	1,647,431
327100	REPLENISHMENT SPARES	0	0	1,082,959	1,504,109	1,604,931
327200	SUPPLY SYSTEM MANAGEMENT	0	42,500	42,500	42,500	42,500
328000	TRAINING	0	0	41,300	51,300	51,300
328100	OPERATOR	0	0	16,000	20,000	20,000
328200	O/I LEVEL MAINTENANCE	0	0	24,000	30,000	30,000
328300	DEPOT LEVEL MAINTENANCE	0	0	1,300	1,300	1,300
330000	TERMINATION	0	0	0	0	18,000

COST BREAKDOWN TOTALS

$$$ COSTS IN DOLLARS $$$ ******BASE YEAR= 1 ,CONSTANT DOLLARS******

COST BREAKDOWN STRUCTURE NUMBER	COST BREAKDOWN STRUCTURE ELEMENT	TOTAL ADJUSTED COST	PERCENTS OF TOTAL ADJUSTED COST FOR TOTAL LIFE CYCLE				
000000	TOTAL LIFE CYCLE	46,457,525					100.0
100000	RESEARCH AND DEVELOPMENT	3,960,000				8.5	
110000	VALIDATION	750,000			1.6		
111000	CONTRACTOR	500,000		1.1			
112000	GOVERNMENT	250,000		0.5			
120000	FULL SCALE DEVELOPMENT	3,210,000			6.9		
121000	CONTRACTOR	2,325,000		5.0			
121100	MANAGEMENT	200,000	0.4				
121200	ENGINEERING	800,000	1.7				
121300	PROTOTYPE HARDWARE	600,000	1.3				
121400	SOFTWARE	150,000	0.3				
121500	TEST AND EVALUATION	75,000	0.2				
121600	DOCUMENTATION	150,000	0.3				
121700	SUPPORT AND TEST EQUIPMENT	350,000	0.8				
122000	GOVERNMENT	885,000		1.9			
122100	PROGRAM MANAGEMENT	550,000	1.2				
122200	PROTOTYPE TEST AND EVALUATION	335,000	0.7				
122210	TRAINING	10,000	0.0				
122220	TEST SITE ACTIVATION	50,000	0.1				
122230	TEST AND EVALUATION	275,000	0.6				
200000	INVESTMENT	11,617,224				25.0	
210000	GOVERNMENT PROGRAM MANAGEMENT	920,000			2.0		
220000	PRIME EQUIPMENT ACQUISITION	5,610,000			12.1		
221000	PRODUCTION HARDWARE	5,000,000		10.8			
222000	PRODUCTION SUPPORT AND SERVICES	350,000		0.8			
223000	PRODUCTION TEST AND EVALUATION	50,000		0.1			
224000	TRANSPORTATION	60,000		0.1			
225000	INSTALLATION AND CHECKOUT	150,000		0.3			
230000	INITIAL SUPPORT ACQUISITION	5,087,224			11.0		
231000	SUPPORT AND TEST EQUIPMENT ACQUISITION	500,000		1.1			
232000	SUPPLY SUPPORT	3,261,974		7.0			
232100	INITIAL SPARES	3,219,474	6.9				
232110	PRIME EQUIPMENT	3,094,474	6.7				
232120	SUPPORT AND TEST EQUIPMENT	125,000	0.3				
232200	NEW NSN ENTRY INTO THE SUPPLY SYSTEM	42,500	0.1				
233000	FACILITIES	825,000		1.8			
233100	OPERATIONAL	225,000	0.5				
233200	MAINTENANCE	600,000	1.3				
234000	DOCUMENTATION	300,250		0.6			
234100	ACQUISITION	300,000	0.6				
234200	REPRODUCTION AND DISTRIBUTION	250	0.0				
235000	TRAINING	200,000		0.4			
235100	OPERATOR	50,000	0.1				
235200	O/I LEVEL MAINTENANCE	75,000	0.2				

COST BREAKDOWN TOTALS

$$$ COSTS IN DOLLARS $$$ *****BASE YEAR= 1 ,CONSTANT DOLLARS*****

COST BREAKDOWN STRUCTURE NUMBER	COST BREAKDOWN STRUCTURE ELEMENT	TOTAL ADJUSTED COST	<----------PERCENTS OF TOTAL ADJUSTED COST----------> FOR TOTAL LIFE CYCLE			
235300	DEPOT LEVEL MAINTENANCE	10,000		0.0		
235400	INSTRUCTOR	15,000		0.0		
235500	TRAINING AIDS	50,000		0.1		
300000	OPERATING AND SUPPORT	30,850,301				66.5
310000	OPERATION	8,050,758			17.3	
311000	PERSONNEL	3,525,758		7.6		
312000	FACILITIES	3,360,000		7.2		
313000	ENERGY CONSUMPTION	896,000		1.9		
314000	MATERIAL CONSUMPTION	224,000		0.5		
315000	SOFTWARE MAINTENANCE	45,000		0.1		
320000	SUPPORT	22,811,543			49.1	
321000	CORRECTIVE MAINTENANCE	13,670,258		29.4		
321100	LABOR	2,605,815		5.6		
321110	O/I LEVEL (REMOVE & REPLACE)	800,829	1.7			
321120	O/I LEVEL (REPAIR)	1,272,049	2.7			
321130	DEPOT LEVEL (REPAIR)	535,937	1.2			
321200	REPAIR MATERIAL	6,540,522		14.1		
321300	TRANSPORTATION AND PACKAGING	4,520,950		9.7		
321310	MATERIAL HANDLING LABOR	2,773,589	6.0			
321320	PACKAGING MATERIAL	1,356,795	3.0			
321330	SHIPPING	360,567	0.8			
322000	PREVENTIVE MAINTENANCE	706,205		1.5		
322100	LABOR	370,205		0.8		
322200	MATERIAL	336,000		0.7		
323000	OVERHAUL	325,312		0.7		
323100	LABOR	165,312		0.4		
323200	MATERIAL	120,000		0.3		
323300	TRANSPORTATION	40,000		0.1		
324000	SUPPORT & TEST EQUIPMENT MAINTENANCE	1,400,000		3.0		
325000	FACILITIES	1,923,840		4.1		
325100	SHOP SPACE	961,440		2.1		
325110	O/I LEVEL	960,000	2.1			
325120	DEPOT LEVEL	1,440	0.0			
325200	INVENTORY STORAGE	962,400		2.1		
325210	O/I LEVEL	960,000	2.1			
325220	DEPOT LEVEL	2,400	0.0			
326000	DOCUMENTATION MAINTENANCE	80,000		0.2		
327000	SUPPLY SUPPORT	4,561,999		9.8		
327100	REPLENISHMENT SPARES	4,391,999		9.5		
327200	SUPPLY SYSTEM MANAGEMENT	170,000		0.4		
328000	TRAINING	143,900		0.3		
328100	OPERATOR	56,000		0.1		
328200	O/I LEVEL MAINTENANCE	84,000		0.2		
328300	DEPOT LEVEL MAINTENANCE	3,900		0.0		
330000	TERMINATION	18,000			0.0	

GENERAL FUNDING REPORT

COSTS IN DOLLARS

######BASE YEAR= 1 ,CONSTANT DOLLARS######

COST BREAKDOWN STRUCTURE NUMBER	COST BREAKDOWN STRUCTURE ELEMENT	GENERAL TYPE OF FUNDING: R & D	PROCUREMENT	CONSTRUCTION	O & M	MIL. PERSONNEL	OTHERS	TOTAL
000000	TOTAL LIFE CYCLE	3,900,000	10,599,724	6,158,840	19,540,120	6,255,841		46,457,525
100000	RESEARCH AND DEVELOPMENT	3,900,000	0	50,000	0	10,000	0	3,960,000
110000	VALIDATION	750,000	0	0	0	0	0	750,000
111000	CONTRACTOR	500,000	0	0	0	0	0	500,000
112000	GOVERNMENT	250,000	0	0	0	0	0	250,000
120000	FULL SCALE DEVELOPMENT	3,150,000	0	50,000	0	10,000	0	3,210,000
121000	CONTRACTOR	2,325,000	0	0	0	0	0	2,325,000
121100	MANAGEMENT	200,000	0	0	0	0	0	200,000
121200	ENGINEERING	800,000	0	0	0	0	0	800,000
121300	PROTOTYPE HARDWARE	600,000	0	0	0	0	0	600,000
121400	SOFTWARE	150,000	0	0	0	0	0	150,000
121500	TEST AND EVALUATION	75,000	0	0	0	0	0	75,000
121600	DOCUMENTATION	150,000	0	0	0	0	0	150,000
121700	SUPPORT AND TEST EQUIPMENT	350,000	0	0	0	0	0	350,000
122000	GOVERNMENT	825,000	0	50,000	0	10,000	0	885,000
122100	PROGRAM MANAGEMENT	550,000	0	0	0	0	0	550,000
122200	PROTOTYPE TEST AND EVALUATION	275,000	0	50,000	0	10,000	0	335,000
122210	TRAINING	0	0	0	0	10,000	0	10,000
122220	TEST-SITE ACTIVATION	0	0	50,000	0	0	0	50,000
122230	TEST AND EVALUATION	275,000	0	0	0	0	0	275,000
200000	INVESTMENT	0	10,599,724	825,000	52,500	140,000	0	11,617,224
210000	GOVERNMENT PROGRAM MANAGEMENT	0	920,000	0	0	0	0	920,000
220000	PRIME EQUIPMENT ACQUISITION	0	5,610,000	0	0	0	0	5,610,000
221000	PRODUCTION HARDWARE	0	5,000,000	0	0	0	0	5,000,000
222000	PRODUCTION SUPPORT AND SERVICES	0	350,000	0	0	0	0	350,000
223000	PRODUCTION TEST AND EVALUATION	0	50,000	0	0	0	0	50,000
224000	TRANSPORTATION	0	60,000	0	0	0	0	60,000
225000	INSTALLATION AND CHECKOUT	0	150,000	0	0	0	0	150,000
230000	INITIAL SUPPORT ACQUISITION	0	4,069,724	825,000	52,500	140,000	0	5,087,224
231000	SUPPORT AND TEST EQUIPMENT ACQUISITION	0	500,000	0	0	0	0	500,000
232000	SUPPLY SUPPORT	0	3,219,474	0	42,500	0	0	3,261,974
232100	INITIAL SPARES	0	3,219,474	0	0	0	0	3,219,474
232110	PRIME EQUIPMENT	0	3,094,474	0	0	0	0	3,094,474
232120	SUPPORT AND TEST EQUIPMENT	0	125,000	0	0	0	0	125,000
232200	NEW NSN ENTRY INTO THE SUPPLY SYSTEM	0	0	0	42,500	0	0	42,500
233000	FACILITIES	0	0	825,000	0	0	0	825,000
233100	OPERATIONAL	0	0	225,000	0	0	0	225,000
233200	MAINTENANCE	0	0	600,000	0	0	0	600,000
234000	DOCUMENTATION	0	300,250	0	0	0	0	300,250
234100	ACQUISITION	0	300,000	0	0	0	0	300,000
234200	REPRODUCTION AND DISTRIBUTION	0	250	0	0	0	0	250
235000	TRAINING	0	50,000	0	10,000	140,000	0	200,000
235100	OPERATOR	0	0	0	0	50,000	0	50,000
235200	O/I LEVEL MAINTENANCE	0	0	0	0	75,000	0	75,000

GENERAL FUNDING REPORT

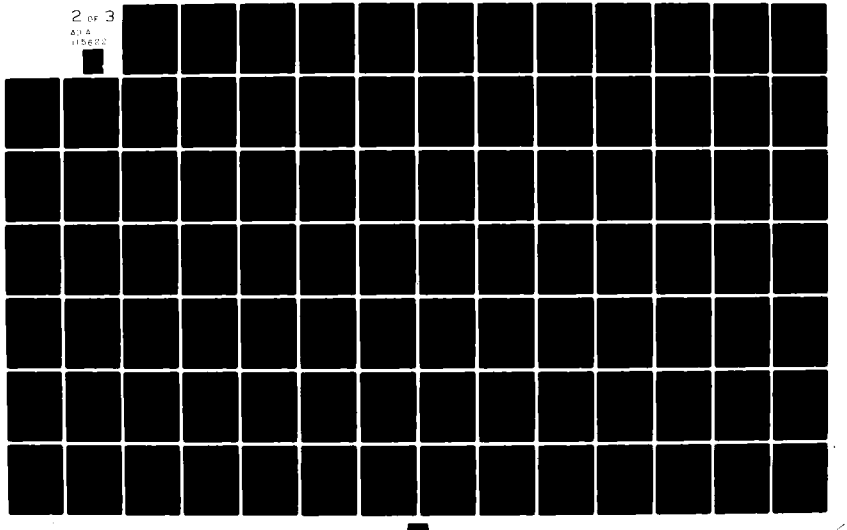
COSTS IN DOLLARS ### *****BASE YEAR= 1 ,CONSTANT DOLLARS*****

COST BREAKDOWN STRUCTURE NUMBER	COST BREAKDOWN STRUCTURE ELEMENT	GENERAL TYPE OF FUNDING						
		R & D	PROCUREMENT	CONSTRUCTION	O & M	MIL. PERSONNEL	OTHERS	TOTAL
235300	DEPOT LEVEL MAINTENANCE	0	0	0	10,000	0	0	10,000
235400	INSTRUCTOR	0	0	0	0	15,000	0	15,000
235500	TRAINING AIDS	0	50,000	0	0	0	0	50,000
300000	OPERATING AND SUPPORT	0	0	5,283,840	19,487,620	6,108,641	0	30,880,301
310000	OPERATION	0	0	3,360,000	1,165,000	3,525,758	0	8,050,758
311000	PERSONNEL	0	0	0	0	3,525,758	0	3,525,758
312000	FACILITIES	0	0	3,360,000	0	0	0	3,360,000
313000	ENERGY CONSUMPTION	0	0	0	696,000	0	0	696,000
314000	MATERIAL CONSUMPTION	0	0	0	224,000	0	0	224,000
315000	SOFTWARE MAINTENANCE	0	0	0	45,000	0	0	45,000
320000	SUPPORT	0	0	1,923,840	18,304,620	2,583,053	0	22,811,513
321000	CORRECTIVE MAINTENANCE	0	0	0	11,597,409	2,072,878	0	13,670,288
321100	LABOR	0	0	0	535,937	2,072,878	0	2,608,815
321110	O/I LEVEL (REMOVE & REPLACE)	0	0	0	0	800,829	0	800,829
321120	O/I LEVEL (REPAIR)	0	0	0	0	1,272,049	0	1,272,049
321130	DEPOT LEVEL (REPAIR)	0	0	0	535,937	0	0	535,937
321200	REPAIR MATERIAL	0	0	0	6,540,522	0	0	6,540,522
321300	TRANSPORTATION AND PACKAGING	0	0	0	4,520,950	0	0	4,520,950
321310	MATERIAL HANDLING LABOR	0	0	0	2,773,559	0	0	2,773,559
321320	PACKAGING MATERIAL	0	0	0	1,386,795	0	0	1,386,795
321330	SHIPPING	0	0	0	360,567	0	0	360,567
322000	PREVENTIVE MAINTENANCE	0	0	0	336,000	370,205	0	706,205
322100	LABOR	0	0	0	0	370,205	0	370,205
322200	MATERIAL	0	0	0	336,000	0	0	336,000
323000	OVERHAUL	0	0	0	325,312	0	0	325,312
323100	LABOR	0	0	0	165,312	0	0	165,312
323200	MATERIAL	0	0	0	120,000	0	0	120,000
323300	TRANSPORTATION	0	0	0	40,000	0	0	40,000
324000	SUPPORT & TEST EQUIPMENT MAINTENANCE	0	0	0	1,400,000	0	0	1,400,000
325000	FACILITIES	0	0	1,923,840	0	0	0	1,923,840
325100	SHOP SPACE	0	0	961,440	0	0	0	961,440
325110	O/I LEVEL	0	0	960,000	0	0	0	960,000
325120	DEPOT LEVEL	0	0	1,440	0	0	0	1,440
325200	INVENTORY STORAGE	0	0	962,400	0	0	0	962,400
325210	O/I LEVEL	0	0	960,000	0	0	0	960,000
325220	DEPOT LEVEL	0	0	2,400	0	0	0	2,400
326000	DOCUMENTATION MAINTENANCE	0	0	0	80,000	0	0	80,000
327000	SUPPLY SUPPORT	0	0	0	4,561,999	0	0	4,561,999
327100	REPLENISHMENT SPARES	0	0	0	4,391,999	0	0	4,391,999
327200	SUPPLY SYSTEM MANAGEMENT	0	0	0	170,000	0	0	170,000
328000	TRAINING	0	0	0	3,900	140,000	0	143,900
328100	OPERATOR	0	0	0	0	56,000	0	56,000
328200	O/I LEVEL MAINTENANCE	0	0	0	0	84,000	0	84,000
328300	DEPOT LEVEL MAINTENANCE	0	0	0	3,900	0	0	3,900
330000	TERMINATION	0	0	0	18,000	0	0	18,000

AD-A115 622 NAVAL WEAPONS ENGINEERING SUPPORT ACTIVITY WASHINGTON DC F/G 5/1
USER'S GUIDE FOR NAVAL MATERIAL COMMAND'S LIFE CYCLE COST (FLEX--ETC(U)
APR 82 R DRESS, T STRUVEN

UNCLASSIFIED NMAT/LCC-FLEX9E DOD-DF-82-007A NL

2 OF 3
AD A
115622



ANNUAL COST BY FUNDING TYPE

$$$ COSTS IN DOLLARS $$$ ***** BASE YEAR= 1 ,CONSTANT DOLLARS *****

YEAR	R & D	PROCUREMENT	CONSTRUCTION	O & M	MIL. PERSONNEL	OTHERS	TOTAL
	FUNDING TYPE						
1	3,900,000	975,000	50,000	0	10,000	0	4,935,000
2	0	5,168,851	1,030,960	115,000	77,500	0	6,392,311
3	0	2,741,161	1,715,960	4,837,394	1,701,753	0	10,996,268
4	0	1,714,712	1,680,960	6,574,625	2,176,305	0	12,146,602
5	0	0	1,680,960	8,013,102	2,293,283	0	11,987,344
TOTAL	3,900,000	10,599,724	6,158,840	19,540,120	6,258,841	0	46,457,525

ANNUAL COST BY COST CATEGORY

$$$ COSTS IN DOLLARS $$$ &&&&&BASE YEAR= 1 ,CONSTANT DOLLARS&&&&&

YEAR	CONTRACTOR	PROGRAM MANAGEMENT	TESTING	PRIME EQUIPMENT	TRAINING	SUPPLY SUPPORT	TECHNICAL DATA	SUPPORT EQUIPMENT	OPERATION	MAINTENANCE	TOTAL
	COST CATEGORY										
1	2,825,000	800,000	325,000	0	60,000	125,000	300,000	500,000	0	0	4,935,000
2	0	650,000	50,000	2,955,000	67,500	1,598,601	20,250	0	150,000	880,960	6,372,311
3	0	270,000	0	1,563,000	78,800	2,033,620	20,000	0	2,377,360	4,653,488	10,996,268
4	0	0	0	1,042,000	74,300	2,219,321	20,000	0	2,874,199	5,914,782	12,146,602
5	0	0	0	0	51,300	1,865,431	20,000	0	2,874,199	7,176,414	11,987,344
TOTAL	2,825,000	1,720,000	375,000	5,560,000	353,900	7,841,973	380,250	500,000	8,275,758	18,625,644	46,457,525

SENSITIVITY ANALYSIS

$$$ COSTS IN DOLLARS $$$ ******BASE YEAR= 1 ,CONSTANT DOLLARS******

SENSITIZED VARIABLE:
CU UNIT PRICE OF ONE OF THE CONTRACTORS EQUIPMENT ($/EQUIPMENT)

SEN. NUM.	VALUE	COST ELEMENT DEVELOPMENT $	%	INVESTMENT $	%	O&S $	%	TOTAL LIFE CYCLE $	%
0	30,000.00	3,960,000	0.0	11,617,224	0.0	30,880,301	0.0	46,457,525	0.0
1	25,000.00	3,960,000	0.0	9,117,224	-21.5	30,880,301	0.0	43,957,525	-5.4
2	30,000.00	3,960,000	0.0	9,617,224	-17.2	30,880,301	0.0	44,457,525	-4.3
3	35,000.00	3,960,000	0.0	10,117,224	-12.9	30,880,301	0.0	44,957,525	-3.2
4	40,000.00	3,960,000	0.0	10,617,224	-8.6	30,880,301	0.0	45,457,525	-2.2
5	45,000.00	3,960,000	0.0	11,117,224	-4.3	30,880,301	0.0	45,957,525	-1.1
6	30,000.00	3,960,000	0.0	11,617,224	0.0	30,880,301	0.0	46,457,525	0.0
7	55,000.00	3,960,000	0.0	12,117,224	4.3	30,880,301	0.0	46,957,525	1.1
8	60,000.00	3,960,000	0.0	12,617,224	8.6	30,880,301	0.0	47,457,525	2.2
9	65,000.00	3,960,000	0.0	13,117,224	12.9	30,880,301	0.0	47,957,525	3.2
10	70,000.00	3,960,000	0.0	13,617,224	17.2	30,880,301	0.0	48,457,525	4.3
11	75,000.00	3,960,000	0.0	14,117,224	21.5	30,880,301	0.0	48,957,525	5.4

SEN. NUM. 0 DENOTES BASE VALUES
% - PERCENT CHANGE FROM BASE VALUE

SENSITIVITY ANALYSIS

$$$ COSTS IN DOLLARS $$$ *****BASE YEAR= 1 ,CONSTANT DOLLARS*****

SENSITIZED VARIABLE:
B MEAN TIME BETWEEN FAILURES OF THE SPARE/REPAIR ITEM (HR/ITEM)

SEN. NUM.	VALUE	COST ELEMENT: DEVELOPMENT $	%	INVESTMENT $	%	O&S $	%	TOTAL LIFE CYCLE $	%
0	1.00	3,960,000	0.0	11,617,224	0.0	30,680,301	0.0	46,457,525	0.0
1	0.50	3,960,000	0.0	14,711,698	26.6	48,942,589	56.5	67,614,287	45.5
2	0.60	3,960,000	0.0	13,680,206	17.8	42,921,827	39.0	60,562,033	30.4
3	0.70	3,960,000	0.0	12,943,428	11.4	38,621,283	25.1	55,524,711	19.5
4	0.80	3,960,000	0.0	12,390,843	6.7	35,395,573	14.6	51,746,716	11.4
5	0.90	3,960,000	0.0	11,961,055	3.0	32,597,222	6.5	48,508,277	5.1
6	1.00	3,960,000	0.0	11,617,224	0.0	30,680,301	0.0	46,457,525	0.0
7	1.10	3,960,000	0.0	11,335,905	-2.4	29,238,276	-5.3	44,534,184	-4.1
8	1.20	3,960,000	0.0	11,101,478	-4.4	27,869,920	-9.7	42,931,398	-7.6
9	1.30	3,960,000	0.0	10,903,115	-6.1	26,712,081	-13.5	41,575,196	-10.5
10	1.40	3,960,000	0.0	10,733,099	-7.6	25,719,649	-16.7	40,412,735	-13.0
11	1.50	3,960,000	0.0	10,585,733	-8.9	24,859,539	-19.5	39,405,273	-15.2

SEN. NUM. 0 DENOTES BASE VALUES
% - PERCENT CHANGE FROM BASE VALUE

SENSITIVITY ANALYSIS

$$$ COSTS IN DOLLARS $$$ ******BASE YEAR= 1 ,CONSTANT DOLLARS******

MATRIX OF VALUES FOR THE SENSITIVITY ANALYSIS OF VARIABLE R

SEN. NUM. / MULTIPLIER	0 1.00	1 0.50	2 0.60	3 0.70	4 0.80	5 0.90	6 1.00	7 1.10	8 1.20	9 1.30	10 1.40	11 1.50
ARRAY INDEX												
1	750.00	375.00	450.00	525.00	600.00	675.00	750.00	825.00	900.00	975.00	1050.00	1125.00
2	500.00	250.00	300.00	350.00	400.00	450.00	500.00	550.00	600.00	650.00	700.00	750.00
3	870.00	435.00	522.00	609.00	696.00	783.00	870.00	957.00	1044.00	1131.00	1218.00	1305.00
4	600.00	300.00	360.00	420.00	480.00	540.00	600.00	660.00	720.00	780.00	840.00	900.00
5	250.00	125.00	150.00	175.00	200.00	225.00	250.00	275.00	300.00	325.00	350.00	375.00
6	400.00	200.00	240.00	280.00	320.00	360.00	400.00	440.00	480.00	520.00	560.00	600.00
7	600.00	300.00	360.00	420.00	480.00	540.00	600.00	660.00	720.00	780.00	840.00	900.00
8	900.00	450.00	540.00	630.00	720.00	810.00	900.00	990.00	1080.00	1170.00	1260.00	1350.00
9	350.00	175.00	210.00	245.00	280.00	315.00	350.00	385.00	420.00	455.00	490.00	525.00
10	350.00	175.00	210.00	245.00	280.00	315.00	350.00	385.00	420.00	455.00	490.00	525.00
11	350.00	175.00	210.00	245.00	280.00	315.00	350.00	385.00	420.00	455.00	490.00	525.00
12	350.00	175.00	210.00	245.00	280.00	315.00	350.00	385.00	420.00	455.00	490.00	525.00
13	700.00	350.00	420.00	490.00	560.00	630.00	700.00	770.00	840.00	910.00	980.00	1050.00
14	1200.00	600.00	720.00	840.00	960.00	1080.00	1200.00	1320.00	1440.00	1560.00	1680.00	1800.00
15	1500.00	750.00	900.00	1050.00	1200.00	1350.00	1500.00	1650.00	1800.00	1950.00	2100.00	2250.00

SEN. NUM. 0 DENOTES BASE VALUES
% - PERCENT CHANGE FROM BASE VALUE

$$$ COSTS IN DOLLARS $$$

SENSITIVITY ANALYSIS

******BASE YEAR= 1 ,CONSTANT DOLLARS******

SENSITIZED VARIABLE:
ID MULTIPLIER FOR INFLATION RATES (IRCON, IROM, IRPROC, AND IRRD) FOR SENSITIVITY ANALYSIS

SEN. NUM.	VALUE	COST ELEMENT DEVELOPMENT $	%	INVESTMENT $	%	O&S $	%	TOTAL LIFE CYCLE $	%
0	1.00	3,960,000	0.0	11,617,224	0.0	30,860,301	0.0	46,457,525	0.0
1	0.50	3,960,000	0.0	11,617,224	0.0	30,860,301	0.0	46,457,525	0.0
2	0.60	3,960,000	0.0	11,617,224	0.0	30,860,301	0.0	46,457,525	0.0
3	0.70	3,960,000	0.0	11,617,224	0.0	30,860,301	0.0	46,457,525	0.0
4	0.80	3,960,000	0.0	11,617,224	0.0	30,860,301	0.0	46,457,525	0.0
5	0.90	3,960,000	0.0	11,617,224	0.0	30,860,301	0.0	46,457,525	0.0
6	1.00	3,960,000	0.0	11,617,224	0.0	30,860,301	0.0	46,457,525	0.0
7	1.10	3,960,000	0.0	11,617,224	0.0	30,860,301	0.0	46,457,525	0.0
8	1.20	3,960,000	0.0	11,617,224	0.0	30,860,301	0.0	46,457,525	0.0
9	1.30	3,960,000	0.0	11,617,224	0.0	30,860,301	0.0	46,457,525	0.0
10	1.40	3,960,000	0.0	11,617,224	0.0	30,860,301	0.0	46,457,525	0.0
11	1.50	3,960,000	0.0	11,617,224	0.0	30,860,301	0.0	46,457,525	0.0

SEN. NUM. 0 DENOTES BASE VALUES
% - PERCENT CHANGE FROM BASE VALUE

SENSITIVITY ANALYSIS

$$$ COSTS IN DOLLARS $$$ *****BASE YEAR= 1 ,CONSTANT DOLLARS*****

MATRIX OF VALUES FOR THE SENSITIVITY ANALYSIS OF VARIABLE IR

SEN. NUM. / MULTIPLIER		0 1.00	1 0.50	2 0.60	3 0.70	4 0.80	5 0.90	6 1.00	7 1.10	8 1.20	9 1.30	10 1.40	11 1.50
ARRAY INDEX													
1	1	0.05	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07
1	2	0.05	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07
1	3	0.05	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07
1	4	0.05	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07
1	5	0.05	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07
2	1	0.06	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08	0.09
2	2	0.06	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08	0.09
2	3	0.06	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08	0.09
2	4	0.06	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08	0.09
2	5	0.06	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08	0.09
3	1	0.06	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08
3	2	0.06	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08
3	3	0.06	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08
3	4	0.06	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08
3	5	0.06	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08
4	1	0.07	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.10	0.10
4	2	0.07	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.10	0.10
4	3	0.07	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.10	0.10
4	4	0.07	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.10	0.10
4	5	0.07	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.10	0.10

SEN. NUM. 0 DENOTES BASE VALUES
% - PERCENT CHANGE FROM BASE VALUE

SUMMARY

$$$ COSTS IN DOLLARS $$$ %%%%%BASE YEAR= 1 ,INFLATED DOLLARS%%%%%

COST CATEGORY	COST ELEMENT: DEVELOPMENT	INVESTMENT	O&S	COST CATEGORY TOTAL
CONTRACTOR	3,036,875	0	0	3,036,875
% OF COST CATEGORY TOTAL	100.0	0.0	0.0	100.0
% OF COST ELEMENT TOTAL	71.3	0.0	0.0	4.7
PROGRAM MANAGEMENT	860,000	1,121,850	0	1,981,850
% OF COST CATEGORY TOTAL	43.4	56.6	0.0	100.0
% OF COST ELEMENT TOTAL	20.2	7.8	0.0	3.1
TESTING	349,725	59,400	0	409,125
% OF COST CATEGORY TOTAL	85.5	14.5	0.0	100.0
% OF COST ELEMENT TOTAL	8.2	0.4	0.0	0.6
PRIME EQUIPMENT	0	7,005,929	0	7,005,929
% OF COST CATEGORY TOTAL	0.0	100.0	0.0	100.0
% OF COST ELEMENT TOTAL	0.0	48.6	0.0	10.8
TRAINING	11,050	249,200	216,693	476,943
% OF COST CATEGORY TOTAL	2.3	52.2	45.4	100.0
% OF COST ELEMENT TOTAL	0.3	1.7	0.5	0.7
SUPPLY SUPPORT	0	4,112,238	6,948,496	11,060,734
% OF COST CATEGORY TOTAL	0.0	37.2	62.8	100.0
% OF COST ELEMENT TOTAL	0.0	28.5	15.1	17.1
TECHNICAL DATA	0	327,297	114,160	441,457
% OF COST CATEGORY TOTAL	0.0	74.1	25.9	100.0
% OF COST ELEMENT TOTAL	0.0	2.3	0.2	0.7
SUPPORT EQUIPMENT	0	545,000	0	545,000
% OF COST CATEGORY TOTAL	0.0	100.0	0.0	100.0
% OF COST ELEMENT TOTAL	0.0	3.8	0.0	0.8
OPERATION	0	270,900	11,712,560	11,983,460
% OF COST CATEGORY TOTAL	0.0	2.3	97.7	100.0
% OF COST ELEMENT TOTAL	0.0	1.9	25.4	18.5
MAINTENANCE	0	722,400	27,036,789	27,759,189
% OF COST CATEGORY TOTAL	0.0	2.6	97.4	100.0
% OF COST ELEMENT TOTAL	0.0	5.0	58.7	42.9
COST ELEMENT TOTAL	4,257,650	14,414,214	46,028,698	64,700,562
% OF LIFE CYCLE COST	6.6	22.3	71.1	100.0

SUMMARY

$$$ COSTS IN DOLLARS $$$ ******BASE YEAR= 1 ,INFLATED AND DISCOUNTED******

COST CATEGORY	COST ELEMENT: DEVELOPMENT	INVESTMENT	O&S	COST CATEGORY TOTAL
CONTRACTOR	2,760,025	0	0	2,760,025
% OF COST CATEGORY TOTAL	100.0	0.0	0.0	100.0
% OF COST ELEMENT TOTAL	71.3	0.0	0.0	6.0
PROGRAM MANAGEMENT	781,600	901,010	0	1,682,610
% OF COST CATEGORY TOTAL	46.5	53.5	0.0	100.0
% OF COST ELEMENT TOTAL	20.2	7.9	0.0	3.6
TESTING	317,875	49,100	0	366,975
% OF COST CATEGORY TOTAL	86.6	13.4	0.0	100.0
% OF COST ELEMENT TOTAL	8.2	0.4	0.0	0.8
PRIME EQUIPMENT	0	5,427,097	0	5,427,097
% OF COST CATEGORY TOTAL	0.0	100.0	0.0	100.0
% OF COST ELEMENT TOTAL	0.0	47.8	0.0	11.7
TRAINING	10,050	201,312	146,581	357,944
% OF COST CATEGORY TOTAL	2.8	56.2	41.0	100.0
% OF COST ELEMENT TOTAL	0.3	1.8	0.5	0.8
SUPPLY SUPPORT	0	3,185,249	4,666,882	7,852,131
% OF COST CATEGORY TOTAL	0.0	40.6	59.4	100.0
% OF COST ELEMENT TOTAL	0.0	28.1	15.0	17.0
TECHNICAL DATA	0	297,545	81,280	378,825
% OF COST CATEGORY TOTAL	0.0	78.5	21.5	100.0
% OF COST ELEMENT TOTAL	0.0	2.6	0.3	0.8
SUPPORT EQUIPMENT	0	495,500	0	495,500
% OF COST CATEGORY TOTAL	0.0	100.0	0.0	100.0
% OF COST ELEMENT TOTAL	0.0	4.4	0.0	1.1
OPERATION	0	216,675	7,926,273	8,142,948
% OF COST CATEGORY TOTAL	0.0	2.7	97.3	100.0
% OF COST ELEMENT TOTAL	0.0	1.9	25.5	17.6
MAINTENANCE	0	577,600	18,228,214	18,805,814
% OF COST CATEGORY TOTAL	0.0	3.1	96.9	100.0
% OF COST ELEMENT TOTAL	0.0	5.1	58.7	40.6
COST ELEMENT TOTAL	3,869,550	11,351,289	31,049,231	46,270,070
% OF LIFE CYCLE COST	8.4	24.5	67.1	100.0

APPENDIX C

OTHER PROGRAM INFORMATION

C.0 Other Program Information

C.1 JCL Deck Setup

Each IBM systen is slightly different and JCL naming conventions will also differ from system to system. This means, in effect, that the user will have to create his own JCL fiel, or at least, modify the example that is included. (See figure 4.1-1.) If the user is not well acquainted with JCL or the system, it is recommended that outside help be obtained in setting up this file.

C.2 Special Functions

The FLEX program uses standard functions throughout with the exception of the Hughes DATE function that is evoked in the main program. The form of this statement is:

```
CALL DATE (IDATE)
```

where IDATE is a three member array variable used to store twelve alpha-numeric characters.

ØMMMØDDgYYYY (e.g. Oct. 03, 1981)

C.3. FLEX Capability

C.3.1 Introduction

This is a more technical and complete description of the capabilities the FLEX program can support. Any excesses will cause fatal errors to be generated.

C.3.2 Number of Cost Elements

There is space for 111 Cost elements and equations.

C.3.3 Number of Equation Elements

Equations elements are the arrays, scalars, operators, and constatns that comprise the equations. NOTE: (Arrays count as two equation elements because of the subscript.) There is space for 2002 equation elements.

C.3.4 Number of New Scalar Variables

Scalar Variables are those that can hold only a single value throughout a run. There is space for 113 scalars. Each scalar name can be to eleven characters long.

C.3.5 Number of New Array Variables

Array Variables are subscripted variables that may hold any number of values depending on the subscript value. There is space for a total number of 3001 array elements with space for 109 different array names. Each array name can be up to eight characters long with three characters left for the subscript field (a total of eleven characters.)

C.3.6 Number of Reporting Periods

The FLEX program describes reporting periods as "years" although they can be any specified time period. There is space for up to 60 reporting periods.

C.3.7 Number of Cost Categories

There is space for ten different cost categories. (See section 3.2.4 for the default NAMELIST values.) Each can be 24 characters long.

C.3.8 Number of Funding Types

There is space for six different funding types. (See section 3.2.4 for the default NAMELIST values.) Each can be sixteen characters long.

C.3.9 Number of Major Cost Elements

Major cost elements are those whose CBS number is of the form X00000, where X represents an integer value from 1 to 9. They are the subdivisions just under the Total Life Cycle. There is space for six different major cost elements. (See section 3.2.4 for the default NAMELIST values.) Each can be sixteen characters long.

```
//TT18635F JOB (1,006,AF5703,00,42,SNUMB),'CAROL_ANNE_MEILE',          00000010
// CLASS=E,NOTIFY=TT18635,MSGCLASS=A                                    00000020
//S1 EXEC PGM=IEBGENER IDENTIFICATION FILE                             00000030
//SYSPRINT DD DUMMY                                                    00000040
//SYSUT1 DD DDNAME=IDENT                                               00000050
//SYSUT2 DD DCB=(RECFM=FB,LRECL=80,BLKSIZE=4080),                      00000060
// DISP=(NEW,PASS),DSN=&TEMP2,                                         00000070
// SPACE=(TRK,(5,5)),UNIT=SYSDA                                        00000080
//SYSIN DD DUMMY,DISP=                                                 00000090
//IDENT DD DSN=TT18635.FLX9DEQP.DATA(IDENT),DISP=SHR                   00000100
//S2 EXEC PGM=IEBGENER DS - NV DEFAULT FILE &TEMP11                    00000110
//SYSPRINT DD DUMMY                                                    00000120
//SYSUT1 DD DDNAME=DSNVDFL                                             00000130
//SYSUT2 DD DCB=(RECFM=FB,LRECL=80,BLKSIZE=4080),                      00000140
// DISP=(NEW,PASS),DSN=&TEMP11,                                        00000150
// SPACE=(TRK,(5,5)),UNIT=SYSDA                                        00000160
//SYSIN DD DUMMY,DISP=                                                 00000170
//DSNVDFL DD DSN=TT18635.FLX9DEQP.DATA(DSDFL),DISP=SHR                 00000180
//S3 EXEC PGM=IEBGENER CS - EQ DEFAULT FILE &TEMP13                    00000190
//SYSPRINT DD DUMMY                                                    00000200
//SYSUT1 DD DDNAME=CSEQDFL                                             00000205
//SYSUT2 DD DCB=(RECFM=FB,LRECL=80,BLKSIZE=4080),                      00000210
// DISP=(NEW,PASS),DSN=&TEMP13,                                        00000215
// SPACE=(TRK,(5,5)),UNIT=SYSDA                                        00000220
//SYSIN DD DUMMY,DISP=                                                 00000225
//CSEQDFL DD DSN=TT18635.FLX9DEQP.DATA(CSDFL),DISP=SHR                 00000230
//S4 EXEC PGM=IEBGENER CS = EQ MODIFICATION FILE                       00000235
//SYSPRINT DD DUMMY                                                    00000240
//SYSUT1 DD DDNAME=CS                                                  00000245
//SYSUT2 DD DCB=(RECFM=FB,LRECL=80,BLKSIZE=4080),                      00000250
// DISP=(NEW,PASS),DSN=&TEMP14,                                        00000255
// SPACE=(TRK,(5,5)),UNIT=SYSDA                                        00000260
//SYSIN DD DUMMY,DISP=                                                 00000265
//CS DD DSN=TT18635.FLX9DEQP.DATA(CS),DISP=SHR                         00000270
//S5 EXEC PGM=IEBGENER DATA FILE WITH CN RM AND NAMELIST               00000275
//SYSPRINT DD DUMMY                                                    00000280
//SYSUT1 DD DDNAME=DATA                                                00000285
//SYSUT2 DD DCB=(RECFM=FB,LRECL=80,BLKSIZE=4080),                      00000290
// DISP=(NEW,PASS),DSN=&TEMP5,                                         00000300
// SPACE=(TRK,(5,5)),UNIT=SYSDA                                        00000305
//SYSIN DD DUMMY,DISP=                                                 00000310
//DATA DD DSN=TT18635.FLX9DEQP.DATA(DATA),DISP=SHR                     00000315
//S6 EXEC PGM=IEBGENER DS - NV MODIFICATION FILE                       00000320
//SYSPRINT DD DUMMY                                                    00000325
//SYSUT1 DD DDNAME=NV                                                  00000330
//SYSUT2 DD DCB=(RECFM=FB,LRECL=80,BLKSIZE=4080),                      00000335
// DISP=(NEW,PASS),DSN=&TEMP12,                                        00000340
// SPACE=(TRK,(5,5)),UNIT=SYSDA                                        00000345
//NV DD DSN=TT18635.FLX9DEQP.DATA(NV),DISP=SHR                         00000350
//SYSIN DD DUMMY,DISP=                                                 00000355
//S7 EXEC PGM=IEBGENER SENSITIVITY ANALYSIS FILE                       00000360
//SYSPRINT DD DUMMY                                                    00000365
//SYSUT1 DD DDNAME=SA                                                  00000370
//SYSUT2 DD DCB=(RECFM=FB,LRECL=80,BLKSIZE=4080),                      00000375
// DISP=(NEW,PASS),DSN=&TEMP15,                                        00000380
// SPACE=(TRK,(5,5)),UNIT=SYSDA                                        00000385
//SYSIN DD DUMMY,DISP=                                                 00000390
//SA DD DSN=TT18635.FLX9DEQP.DATA(SA),DISP=SHR                         00000395
//STEP1 EXEC PGM=FLEX,PARM='1',TIME=(1,30)                             00000400
//STEPLIB DD DISP=SHR,DSN=TT18635.FLEX.LOAD                            00000405
//FT01F001 DD DCB=(RECFM=FB,LRECL=80,BLKSIZE=4080),                    00000410
// DSN=&TEMP1,SPACE=(TRK,(20,10)),UNIT=SYSDA                           00000420
//FT02F001 DD DSN=&TEMP2,DISP=(OLD,PASS)                               00000430
//FT03F001 DD DCB=(RECFM=FB,LRECL=80,BLKSIZE=4080),                    00000435
// DSN=&TEMP,SPACE=(TRK,(20,10)),UNIT=SYSDA                            00000440
//FT04F001 DD DCB=(RECFM=FB,LRECL=80,BLKSIZE=4080),                    00000445
// DSN=&TEMP4,SPACE=(TRK,(20,10)),UNIT=SYSDA                           00000450
//FT05F001 DD DSN=&TEMP5,DISP=(OLD,PASS)                               00000452
//FT06F001 DD SYSOUT=*,FCB=(F880,ALIGN)                                00000453
//FT08F001 DD DCB=RECFM=VS,SPACE=(80,(300)),UNIT=SYSDA                 00000455
//FT09F001 DD DCB=(RECFM=FB,LRECL=80,BLKSIZE=4080),                    00000460
// DSN=&TEMP9,SPACE=(TRK,(20,10)),UNIT=SYSDA                           00000470
//FT10F001 DD DCB=(RECFM=VBS,LRECL=132,BLKSIZE=1324),                  00000475
// SPACE=(TRK,(5,5)),UNIT=SYSDA                                        00000480
//FT11F001 DD DSN=&TEMP11,DISP=(OLD,PASS)                              00000485
```

```
//FT12F001 DD DSN=&TEMP12,DISP=(OLD,PASS)                                    00000490
//FT13F001 DD DSN=&TEMP13,DISP=(OLD,PASS)                                    00000495
//FT14F001 DD DSN=&TEMP14,DISP=(OLD,PASS)                                    00000500
//FT15F001 DD DSN=&TEMP15,DISP=(OLD,PASS)                                    00000505
//FT18F001 DD SYSOUT=*,DCB=(RECFM=FBA,LRECL=80,BLKSIZE=80)                   00000510
//FT20F001 DD DSN=TT18635.RES2.DATA,DISP=(NEW,CATLG),                        00000515
// UNIT=TS01,DCB=(RECFM=FB,LRECL=80,BLKSIZE=80),SPACE=(TRK,(3,1),RLSE)       00000516
//FT21F001 DD DUMMY,DISP=(NEW,CATLG),                                        00000520
// UNIT=TS01,DCB=(RECFM=FB,LRECL=80,BLKSIZE=80),SPACE=(TRK,(1,1),RLSE)       00000521
//SYSIN DD DUMMY                                                           00000530
//                                                                         00000540
```

APPENDIX D

SAMPLE NAVMAT EQUIPMENT CBS AND EQUATIONS

Reference: Life Cycle Cost Guide for Equipment Analysis, Naval Weapons Support Activity, Engineering Management Department, Cost Management Division, January 1977.

APPENDIX D

SAMPLE NAVMAT EQUIPMENT CBS AND EQUATIONS

This appendix contains a listing of the sample cost breakdown structure provided by the Navy for their equipment model. Following the CBS is a detailed listing of each equation and each equation cost factor (variable).

D.1 FLEX EQUIPMENT MODEL Cost Breakdown Structure

000000 TOTAL LIFE CYCLE

100000 RESEARCH AND DEVELOPMENT
110000 Validation
111000 Contractor
112000 Government
120000 Full Scale Development
121000 Contractor
121100 Management
121200 Engineering
121300 Prototype Hardware
121400 Software
121500 Test and Evaluation
121600 Documentation
121700 Support and Test Equipment
122000 Government
122100 Program Management
122200 Prototype Test and Evaluation
122210 Training
122220 Test Site Activation
122230 Test and Evaluation

200000 INVESTMENT
210000 Government Program Management
220000 Prime Equipment Acquisition
221000 Production Hardware
222000 Production Support and Services
223000 Production Test and Evaluation
224000 Transportation
225000 Installation and Checkout
230000 Initial Support Acquisition
231000 Support and Test Equipment Acquisition
232000 Supply Support
232100 Initial Spares
232110 Prime Equipment
232120 Support and Test Equipment
232200 New NSN Entry into the Supply System
233000 Facilities

233100	Operational
233200	Maintenance
234000	Documentation
234100	Acquisition
234200	Reproduction and Distribution
235000	Training
235100	Operator
235200	O/I Level Maintenance
235300	Depot Level Maintenance
235400	Instructor
235500	Training Aids
300000	OPERATING AND SUPPORT
310000	Operation
311000	Personnel
312000	Facilities
313000	Energy Consumption
314000	Material Consumption
315000	Software Maintenance
320000	Support
321000	Corrective Maintenance
321100	Labor
321110	O/I Level (Remoe & Replace)
321120	O/I Level (Repair)
321130	Depot Level (Repair)
321200	Repair Material
321300	Transportation and Packaging
321310	Material Handling Labor
321320	Packaging Material
321330	Shipping
322000	Preventive Maintenance
322100	Labor
322200	Material
323000	Overhaul
323100	Labor
323200	Material
323300	Transportation
324000	Support & Test Equipment Maintenance
325000	Facilities
325100	Shop Space
325110	O/I Level
325120	Depot Level
325200	Inventory Storage
325210	O/I Level
325220	Depot Level
326000	Documentation Maintenance
327000	Supply Support
327100	Replenishment Spares
327200	Supply System Management
328000	Training
328100	Operator

328200 O/I Level Maintenance
328300 Depot Level Maintenance
330000 Termination

CBS 121200
Contractor Engineering costs during full scale development effort is

$$\sum_{I=1}^{Y} DCE(I)$$

Where
DCE(I) Contractor Engineering costs ($/yr)

CBS 121300
Contractor prototype hardware development costs during full scale development effort are

$$\sum_{I=1}^{Y} DCH(I)$$

Where
DCH(I) Contractor prototype hardware costs ($/yr)

CBS 121400
Contractor software development costs during full scale development effort are

$$\sum_{I=1}^{Y} DCS(I)$$

Where
DCS(I) Contractor Software development costs ($/yr)

CBS 121500
Contractor development Test & Evaluation costs during full scale development effort is

$$\sum_{I=1}^{Y} DCTE(I)$$

Where
DCTE(I) Contractor development Test & Evaluation costs ($/yr)

CBS 121600
Contractor Documentation costs during full scale development effort are

$$\sum_{I=1}^{Y} DCD(I)$$

Where
DCD(I) Contractor Documentation costs ($/yr)

CBS 121700
Contractor Support & Test equipment development costs during full scale development effort are

$$\sum_{I=1}^{Y} DCST(I)$$

Where
DCST(I) Contractor S&TE development costs ($/yr)

CBS 122100
Government Program Management costs during full scale development effort are

$$\sum_{I=1}^{Y} DGPM(I)$$

Where
DGPM(I) Program Management costs ($/yr)

CBS 122210
Training costs incurred by students during Test & Evaluation maintenance program are

$$\sum_{I=1}^{Y} DGTT(I)$$

Where
DGTT(I) Training costs ($/yr)

CBS 122220
Test Site activation/deactivation costs incurred by Government during full scale development Test & Evaluation program are

$$\sum_{I=1}^{Y} DGTA(I)$$

Where
DGTA(I) Test Site activation/deactivation costs ($/yr)

CBS 122230
Test & Evaluation costs incurred by Government during full scale development Test & Evaluation Program are

$$\sum_{I=1}^{Y} DGTE(I)$$

Where
DGTE(I) Test & Evaluation personnel costs ($/yr)

INVESTMENT COSTS

CBS 210000
Government Program Management cost is

$$\sum_{I=1}^{Y} PMG(I)$$

Where
PMG(I) Program Management costs ($/yr)

CBS 221000
Production hardware costs of the Prime Equipment are

$$\sum_{I=1}^{Y} NN(I) * CU$$

Where
NN(I) Prime equipment annual acceptance schedule (equip./yr)
CU Prime equipment procurement price ($/equip.)

CBS 222000
Production Support & Services costs of the prime equipment are

$$\sum_{I=1}^{Y} PSS(I)$$

Where
PSS(I) Production Support & Services costs ($/yr)

CBS 223000
Production Test & Evaluation costs of the prime equipment are

$$\sum_{I=1}^{Y} PTE(I)$$

Where
PTE(I) Production Test & Evaluation costs ($/yr)

CBS 224000

Transportation to installation site expenditures to cover the cost of moving the prime equipment from the contractors facility to the point of installation are

$$\sum_{I=1}^{Y} NN(I) * CTPE$$

Where

NN(I)	Prime equipment annual acceptance schedule	(equip/yr)
CTPE	Transportation costs	($/equip)

CBS 225000

Installation costs for the Prime Equipment are

$$\sum_{I=1}^{Y} NN(I) * CIPE$$

Where

NN(I)	Prime equipment annual acceptance schedule	(equip/yr)
CIPE	Installation costs	($/equip)

CBS 231000

Acquisition costs of Support & Test equipment are

$$\sum_{I=1}^{Y} STE(I)$$

Where

STE(I)	Support & Test equipment acquisition costs	($/yr)

CBS 232110
Acquisition cost of Primary equipment Initial Spares is

$$\sum_{I=1}^{Y} NN(I) * \sum_{K=1}^{NK} OT*DC(K)*QTY(K)*CST(K)*[DSC(K)*(FPST+FILS) + [1-DSC(K)]*[RSS(K)*FIRT+[1-RSS(K)]*FDRT]] / [R(K)*FR(I)*365]$$

Where

NN(I)	Prime equipment annual acceptance schedule (equip/yr)
OT	Prime equipment annual operating time (hrs/equip/year)
DC(K)	Duty cycle of Kth item (ratio)
QTY(K)	Quantity of Kth item (quantity/item)
CST(K)	Unit cost of the Kth item ($/item)
DSC(K)	Discard rate of Kth item (ratio)
FPST	Procurement lead & safety stockage time for spares (days)
FILS	Required stockage time at O/I level for spares (days)
RSS(K)	Repair level ratio (ratio)
FIRT	Required stockage time for O/I repairable items (days)
FDRT	Required stockage time for depot repairable items (days)
R(K)	Mean time between failures for Kth item (hrs/failure)
FR(I)	Reliability improvement/degradation factor (factor)
K	Designator for a specific spare/repair item
NK	The number of spare/repair items in an equipment

CBS 232120

Acquisition cost of Support & Test Equipment Initial Spares is

$$\sum_{I=1}^{Y} STE(I) * STEM$$

Where

STE(I)	Support & Test equipment acquisition costs ($/yr)
STEM	Material support rate - Percent of S&TE cost (ratio)

CBS 232200
Introduction of new NSN's (National Stock Number) into the supply system costs are

$$\sum_{I=IYI}^{IYI} (NSNP + NSNS) * RIE$$

Where
NSNP Number of new NSN's of Primary Equipment (NSN)
NSNS Number of new NSN's of Support & Test Equipment (NSN)
RIE Average NSN entry into the supply system cost ($/NSN)

CBS 233100
Facility costs incurred by the Government to construct/prepare the operational sites are

$$\sum_{I=1}^{Y} FOS(I)$$

Where
FOS(I) Operational site const/prep. costs ($/yr)

CBS 233200
Facility costs incurred by the government to construct/prepare maintenance sites are

$$\sum_{I=1}^{Y} FMS(I)$$

Where
FMS(I) Maintenance site constr/prep. costs ($/yr)

CBS 234100
Acquisition costs of Technical Data not included in the development costs are

$$\sum_{I=1}^{Y} AD(I)$$

Where
AD(I) Technical Data Acquisition costs ($/yr)

CBS 234200
Reproduction and Distribution costs of Technical Data are

$$\sum_{I=1}^{Y} NC(I) * NP * CP$$

Where

NC(I)	Number of copies	(copies/yr)
NP	Number of pages in a set of technical data	(pages)
CP	Reproduction and distribution costs	($/page/copy)

CBS 235100
Operating personnel pay, allowance, travel costs,and course fees incurred during the initial operator training course are

$$\sum_{I=1}^{Y} PTO(I) * CTO$$

Where

PTO(I)	Number of students	(students/yr)
CTO	Operating personnel training cost	($/student)

CBS 235200
O/I level maintenance personnel pay, allowance,travel costs, and course fees incurred during the initial training course are

$$\sum_{I=1}^{Y} PTM(I) * CTM$$

Where

PTM(I)	Number of students	(students/yr)
CTM	O/I Maintenance personnel training cost	($/student)

CBS 235300
Depot level maintenance personnel pay, allowance,travel costs, and course fees incurred during the initial training course are

$$\sum_{I=1}^{Y} PTP(I) * CTP$$

Where
PTP(I) Number of students (students/yr)
CTP Depot Maintenance personnel training cost ($/student)

CBS 235400
Instructor training personnel pay, allowance,travel costs, and course fees incurred during the initial training course are

$$\sum_{I=1}^{Y} PTI(I) * CTI$$

Where
PTI(I) Number of students (students/yr)
CTI Instructor training cost ($/student)

CBS 235500
Acquisition and installation costs of training aids of the initial training program are

$$\sum_{I=1}^{Y} ATU(I)$$

Where
ATU(I) Acquisition and installation costs of training aids ($)

OPERATING AND SUPPORT COST

CBS311000
Personnel pay and allowance costs incurred by the equipment operators are

$$\sum_{I=1}^{Y} N(I) * PO * RO * OT$$

Where

N(I)	Prime equipment inventory	(equip/yr)
PO	Number of operators per prime equipment	(operator/equip)
RO	Operator hourly pay rate	($/hr/operator)
OT	Prime Equipment operating time	(hrs/equip/yr)

CBS 312000
Facility space costs for providing necessary operational area for the equipment are

$$\sum_{I=1}^{Y} N(I) * PSOS * CSO$$

Where

N(I)	Prime equipment inventory	(equip/yr)
PSOS	Operational area per prime equipment	(sq.ft./equip)
CSO	Operational area space cost	($/sq.ft./yr)

CBS 313000
Energy cost incurred during the equipment operation is

$$\sum_{I=1}^{Y} N(I) * CE * OT$$

Where

N(I)	Prime equipment inventory	(equip/yr)
CE	Energy cost	($/hrs/equip)
OT	Prime Equipment operating time	(hrs/equip/yr)

CBS 314000
Material costs incurred during the equipment operation are

$$\sum_{I=1}^{Y} N(I) * CM * OT$$

Where
- N(I) Prime equipment inventory (equip/yr)
- CM Material cost ($/hr/equip)
- OT Prime equipment operating time (hrs/equip/yr)

CBS 315000
Software maintenance costs incurred during the equipment operation are

$$\sum_{I=1}^{Y} CS(I)$$

Where
- CS(I) Prime equipment software maintenance costs ($/yr)

CBS 321110
O/I level Corrective Maintenance Labor costs for the detection, isolation, removal and replacement of item failures in the prime equipment are

$$\sum_{I=1}^{Y} N(I) * \sum_{K=1}^{NK} OT*DC(K)*QTY(K)*LSO(K)*RSL / [R(K)*FR(I)]$$

Where
- N(I) Prime equipment inventory (equip/yr)
- OT Prime equipment operating time (hrs/equip/yr)
- DC(K) Duty cycle of Kth item (ratio)
- QTY(K) Quantity of Kth item (quantity/item)
- LSO(K) O/I maintenance time to remove,replace Kth item (hrs/item)
- RSL O/I maintenance personnel pay rate ($/hr)
- R(K) Mean time between failures for Kth item (hrs/failure)
- FR(I) Reliability improvement/degradation factor (factor)

CBS 321120
O/I level Corrective Maintenance Labor costs incurred during the repair of a failed item are

$$\sum_{I=1}^{Y} N(I) * \sum_{K=1}^{NK} OT*DC(K)*QTY(K)*LSI(K)*RSL*RSS(K)[1-DSC(K)] / [R(K)*FR(I)]$$

Where

N(I)	Prime equipment inventory (equip/yr)
OT	Prime equipment operating time (hrs/equip/yr)
DC(K)	Duty cycle of Kth item (ratio)
QTY(K)	Quantity of Kth item (quantity/item)
LSI(K)	O/I maintenance time to repair the Kth item (hrs/item)
RSL	O/I maintenance personnel pay rate ($/hr)
RSS(K)	Repair level ratio (ratio)
DSC(K)	Discard rate of Kth item (ratio)
R(K)	Mean time between failures of Kth item (hrs/failure)
FR(I)	Reliability improvement/degradation factor (factor)

CBS 321130
Depot level Corrective Maintenance costs incurred during the repair of a failed item are

$$\sum_{I=1}^{Y} N(I) * \sum_{K=1}^{NK} OT*DC(K)*QTY(K)*LSD(K)*RSD*[1-RSS(K)]*[1-DSC(K)] / [R(K)*FR(I)]$$

Where

N(I)	Prime equipment inventory (equip/yr)
OT	Prime equipment operating time (hrs/equip/yr)
DC(K)	Duty cycle of Kth item (ratio)
QTY(K)	Quantity of Kth item (quantity/item)
LSD(K)	Depot maintenance time to repair Kth item (hrs/item)
RSD	Depot maintenance personnel pay rate ($/hr)
RSS(K)	Repair level ratio (ratio)
DSC(K)	Discard rate of Kth item (ratio)
R(K)	Mean time between failures of Kth item (hrs/failure)
FR(I)	Reliability improvement/degradation factor (factor)

CBS 321200
Corrective Maintenance Repair Material costs are

$$\sum_{I=1}^{Y} N(I) * \sum_{K=1}^{NK} OT*DC(K)*QTY(K)*CST(K)*FM*[1-DSC(K)] / [R(K)*FR(I)]$$

Where

N(I)	Prime equipment inventory (equip/yr)
OT	Prime equipment operating time (hrs/equip/yr)
DC(K)	Duty cycle of Kth item (ratio)
QTY(K)	Quantity of Kth item (quantity/item)
CST(K)	Unit cost of the Kth item ($/item)
FM	Repair material rate. Percent of item cost (ratio)
DSC(K)	Discard rate of Kth item (ratio)
R(K)	Mean time between failures of Kth item (hrs/failure)
FR(I)	Reliability improvement/degradation factor (factor)

CBS 321310
Packaging Labor costs incurred during the process of shipping failed items between the intermediate and depot level maintenance facilities are

$$\sum_{I=1}^{Y} N(I) * \sum_{K=1}^{NK} OT*DC(K)*QTY(K)*2*W(K)*RPL*[1-RSS(K)] * [1-DSC(K)] / [R(K)*FR(I)]$$

Where

N(I)	Prime equipment inventory (equip/yr)
OT	Prime equipment operating time (hrs/equip/yr)
DC(K)	Duty cycle of Kth item (ratio)
QTY(K)	Quantity of Kth item (quantity/item)
W(K)	Weight of Kth item (#)
RPL	Packaging labor cost ($/#)
RSS(K)	Repair level ratio (ratio)
DSC(K)	Discard rate of Kth item (ratio)
R(K)	Mean time between failures of Kth item (hrs/failure)
FR(I)	Reliability improvement/degradation factor (factor)

CBS 321320
Packaging Material cost incurred during the process of shipping failed items between the intermediate and depot level maintenance facilities are

$$\sum_{I=1}^{Y} N(I) * \sum_{K=1}^{NK} OT*DC(K)*QTY(K)*2*W(K)*RPM*[1-RSS(K)] * [1-DSC(K)] / [R(K)*FR(I)]$$

Where

N(I)	Prime equipment inventory (equip/yr)
OT	Prime equipment operating time (hrs/equip/yr)
DC(K)	Duty cycle of Kth item (ratio)
QTY(K)	Quantity of Kth item (quantity/item)
W(K)	Weight of Kth item (#)
RPM	Packaging material cost ($/#)
RSS(K)	Repair level ratio (ratio)
R(K)	Mean time between failures of Kth item (hrs/failure)
FR(I)	Reliability improvement/degradation factor (factor)

CBS 321330
Shipping cost incurred during the transportation of failed items between the intermediate and depot level maintenance facilities are

$$\sum_{I=1}^{Y} N(I) * \sum_{K=1}^{NK} OT*DC(K)*QTY(K)*2*W(K)*RSR*RW(K)*[1-RSS(K)]*[1-DSC(K)] / [R(K)*FR(I)]$$

Where

N(I)	Prime equipment inventory (equip/yr)
OT	Prime equipment operating time (hrs/equip/yr)
DC(K)	Duty cycle of Kth item (ratio)
QTY(K)	Quantity of Kth item (quantity/item)
W(K)	Weight of Kth item (#)
RSR	Shipping cost ($/#)
RW(K)	Item packing weight ratio (shipping Wt/unpacked Wt)
RSS(K)	Repair level ratio (ratio)
DSC(K)	Discard rate of Kth item (ratio)
R(K)	Mean time between failures of Kth item (hrs/failure)
FR(I)	Reliability improvement/degradation factor (factor)

CBS 322100
Preventive Maintenance Labor costs are

$$\sum_{I=1}^{Y} N(I) * \sum_{N=1}^{NM} OT * LPM(N) * RSL / NPM(N)$$

Where

N(I)	Prime equipment inventory (equip/yr)
OT	Prime equipment operating time (hrs/equip/yr)
LPM(N)	Maintenance time of Nth type PM action (hrs/equip/action)
RSL	O/I maintenance personnel pay rate ($/hr)
NPM(N)	Time between inspections of Nth type PM (hrs/action)
N	Designator for a specific preventive maintenance type
NM	Number of preventive maintenance types

CBS 322200
Preventive Maintenance Material costs are

$$\sum_{I=1}^{Y} N(I) * \sum_{N=1}^{NM} OT * MPM(N) / NPM(N)$$

Where

N(I)	Prime equipment inventory (equip/yr)
OT	Prime equipment operating time (hrs/equip/yr)
MPM(N)	Material cost of Nth type PM action ($/equip/action)
NPM(N)	Time between inspections of Nth type PM (hrs/action)
N	Designator of a specific preventive maintenance type
NM	Number of preventive maintenance types

CBS 323100
Prime equipment Overhaul Maintenance Labor costs are

$$\sum_{I=1}^{Y} NOH(I) * OHL * RSD$$

Where

NOH(I)	Prime equipment overhaul schedule (equip/yr)
OHL	Overhaul maintenance time (hrs/equip)
RSD	Depot maintenance pay rate ($/hr)

CBS 323200
Prime equipment Overhaul Maintenance Material costs are

$$\sum_{I=1}^{Y} NOH(I) * OHM$$

Where
NOH(I) Prime equipment overhaul Schedule (equip/yr)
OHM Overhaul maintenance material cost ($/equip)

CBS 323300
Transportation of material costs for shipping equipment and other items during Prime equipment overhaul are

$$\sum_{I=1}^{Y} NOH(I) * OHT$$

Where
NOH(I) Prime equipment overhaul schedule (equip/yr)
OHT Material shipping rate ($/equip)

CBS 324000
Support & Test Equipment Maintenance Labor and Material costs are

$$\sum_{I=1}^{Y} N(I) * STES$$

Where
N(I) Prime equipment inventory (equip/yr)
STES Recurring support cost of S&TE ($/prime equip)

CBS 325110
O/I level maintenance shop space costs are

$$\sum_{I=1}^{Y} MSSI(I) * CSI$$

Where
MSSI(I) O/I maintenance shop space (sq. ft./yr)
CSI O/I maintenance space cost ($/sq. ft.)

CBS 325120
Depot level maintenance shop space costs are

$$\sum_{I=1}^{Y} MSSD(I) * CSD$$

Where
MSSD(I) Depot maintenance shop space (sq. ft/yr)
CSD Depot maintenance space cost ($/sq. ft.)

CBS 325210
O/I level maintenance material storage costs are

$$\sum_{I=1}^{Y} ISSI(I) * CSI$$

Where
ISSI(I) O/I maintenance material storage space (sq. ft./yr)
CSI O/I maintenance space cost ($/sq. ft.)

CBS 325220
Depot level maintenance material storage costs are

$$\sum_{I=1}^{Y} ISSD(I) * CSD$$

Where
ISSD(I) Depot maintenance material storage space (sq. ft./yr)
CSD Depot maintenance space cost ($/sq. ft.)

CBS 326000
Technical data maintenance costs for managing the technical data distribution center are

$$\sum_{I=IYI}^{Y} NP * RDM$$

Where
- NP Number of pages in a set of technical data (pages)
- RDM Technical data management costs ($/page)
- IYI Initial year

CBS 327100
Corrective Maintenance Replenishment Spares costs are

$$\sum_{I=1}^{Y} N(I) * \sum_{K=1}^{NK} OT*DC(K)*QTY(K)*CST(K)*DSC(K) / [R(K)*FR(I)]$$

Where
- N(I) Prime equipment inventory (equip/yr)
- OT Prime equipment operating time (hrs/equip/yr)
- DC(K) duty cycle of Kth item (ratio)
- QTY(K) Quantity of Kth item (quantity/item)
- CST(K) Unit cost of the Kth item ($/item)
- DSC(K) Discard rate of Kth item (ratio)
- R(K) Mean time between failures of Kth item (hrs/failure)
- FR(I) Reliability improvement/degradation factor (factor)

CBS 327200
Supply support management costs are

$$\sum_{I=IYI}^{Y} [NSNP + NSNS] * RIM$$

Where
- NSNP Number of new NSNs for prime equipment (NSN)
- NSNS Number of new NSNs for S&TE equipment (NSN)
- RIM Supply support management costs ($/NSN)
- IYI Initial year

D.3 Equipment Life Cycle Cost Factors (Variables)

Life Cycle Cost Factors
Names, Descriptions, Dimensions and Sources

The material in this appendix contains a listing of the 104 Cost Factors used in the NAVMAT LCC Model. Names, Descriptions, Dimensions and the source of information have been identified for all the Cost Factors. These major sources are:

1. Program Management Office (PMO)
2. Program Manager for Logistics (PM(L)) and/or his/her Logistic Managers
3. The Contractor
4. Analyst

Name	AD(I)
Description	Acquisition cost of data during Investment in year I. This refers to acquiring, writing, assembling, reformating technical manuals and other documentation not covered during Research & Development phase.
Dimension	$/year
Source	PMO

Name	ADC(I)
Description	Government payments to the contractor for technical and managerial work performed during the Validation phase of the Research & Development in year I.
Dimension	$/year
Source	PMO

Name	ADG(I)
Description	Government expenditures for technical and managerial work performed during the Validation phase of the Research & Development in year I.
Dimension	$/year
Source	PMO

Name	ATU(I)
Description	Acquisition, transportation, and installation costs of training aids and devices to conduct operator, maintenance personnel, and instructor training courses during initial training program in year I.
Dimension	$/year
Source	PM(L)

Name	BY
Description	Base year during/from which all cost adjustments are made.
Dimension	Dimensionless
Source	PMO

Name	CE
Description	Energy consumption cost incurred during the operation of the prime equipment.
Dimension	$/hr/equip
Source	PM(L) & Contractor

Name	CIPE
Description	Installation cost of the prime equipment (If not covered by the acquisition cost). This cost refers to the material and services involved in assembling the equipment and complete checkout to assure achievement of operational status.
Dimension	$/equip
Source	PM(L)

Name	CM
Description	Cost of materials consumed during the operation of the prime equipment.
Dimension	$/hr/equip
Source	PM(L) & contractor

Name	CP
Description	Average cost per page of set-up, reproduction, and distribution of technical manuals.
Dimension	$/page/copy
Source	PM(L)

Name	CS(I)
Description	Software maintenance cost during prime equipment operation in year I.
Dimension	$/year
Source	PM(L)

Name	CSD
Description	Area cost for depot level maintenance space
Dimension	$/sq.ft./year
Source	PM(L)

Name	CSI
Description	Area cost for O/I level maintenance space
Dimension	$/sq.ft./year
Source	PM(L)

Name	CSO
Description	Area cost for Operational space.
Dimension	$/sq.ft./year
Source	PM(L)

Name	CST(K)
Description	Unit cost of the Kth spare/repair item.
Dimension	$/item
Source	PM(L)

Name	CTI
Description	Average cost incurred during instructor training course for personnel pay & allowance, travel, and course fees.
Dimension	$/student
Source	PM(L)

Name	CTM
Description	Average cost incurred during O/I maintenance personnel training course for personnel pay & allowance, travel and course fees.
Dimension	$/student
Source	PM(L)

Name	CTO
Description	Average cost incurred during operating personnel training course for personnel pay & allowance, travel, and course fees.
Dimension	$/student
Source	PM(L)

Name	CTP
Description	Average cost incurred during depot maintenance personnel training course for personnel pay & allowance travel, and course fees.
Dimension	$/student
Sourse	PM(L)

Name	CTPE
Description	Transportation cost of prime equipment from contractors facility to installation site (if not included in acquisition cost). This includes the packaging and transportation of the prime equipment from the contractors facility to the first destination, and then to the second destination (operation site).
Dimension	$/equip
Source	PM(L)

Name	CU
Description	Unit price of the prime equipment. In addition to the prime equipment hardware this cost may include part or all of production support and services costs, and transportation and installation cost of the equipment. (These costs should be identified properly to avoid double counting).
Dimension	$/equip
Source	PMO

Name	DC(K)
Description	Duty cycle of the Kth spare/repair item. Percent of prime equipment operating time.
Dimension	Ratio (Item operating time/Equip. operating time)
Source	PM(L) & Contractor

This page is intentionally blank.

Name	DCD(I)
Description	Payment by the Government to the Contractor for all the deliverable data acquired during full scale development in year I. The data requirement will normally be selected from the departmental or agency authorized data list. It includes the effort for acquiring, writing, assembling, reformating, production,packaging and shipping Engineering data, Support data, and Management data required by the government.
Dimension	$/year
Source	PMO

Name	DCE(I)
Description	Payments by the Government to the Contractor for the engineering efforts during full scale development in year I. This includes all engineering efforts associated with the equipment design and development. Specifically, the cost of system engineering, and integration, design engineering, design support engineering, and engineering planning costs. It includes the cost of direct labor, material, overhead, and other direct costs incurred during the engineering process.
Dimension	$/year
Source	PMO

Name	DCH(I)
Description	Payments by the Government to the Contractor for the hardware development efforts during full scale development in year I. This includes the fabrication and assembly of full scale development models in support of the engineering design activity. This includes the cost of direct labor, materials and overhead associated with material procurement and handling, tooling and test equipment in support of manufacturing, fabrication, assembly, system integration, and checkout.
Dimension	$/year
Source	PMO

Name	DCPM(I)
Description	Payment by the Government to the Contractor for the Management effort during full scale development in year I. This refers to the costs incurred for planning, organizing, manning, directing, and controlling the technical and administrative activities of the project. This includes the cost of personnel, services, and overhead associated with cost/schedule control, configuration management, data management, contract management, and ILS (Integrated logistic support) management.
Dimension	$/year
Source	PMO

Name	DCS(I)
Description	Payment by the Government to the Contractor for software development effort for the prime equipment during full scale development in year I. This includes the cost of direct labor, material, overhead, and other direct costs associated with the computer software development.
Dimension	$/year
Source	PMO

Name	DCST(I)
Description	Payment by the Government to the Contractor for the development of the Peculiar Support and Test equipment during full scale development in year I. This refers to all costs inclusive of the software costs associated with Peculiar Support & Test equipment.
Dimension	$/year
Source	PMO

Name	DCTE(I)
Description	Payment by the Government to the Contractor Test & Evaluation efforts during full scale development in year I. This refers to the costs which are incurred in support of the government testing (DTE and IOTE) during the full scale development phase of the equipment life cycle. This cost factor may include for example: spares, repair parts, support & test equipment, training, test site activation, facility requirements, and services. Development test and evaluation (DTE) support is designed to determine and/or verify technical performance and safety characteristics of an item, associated tools and test equipment. It includes determination of structural, mechanical, electrical, chemical and other physical properties of the equipment. DTE is generally conducted in contractors facilities. Initial operational test and evaluation (IOTE) support refers to the operational test and evaluation performed during the full scale development prior to the production decision to provide information as to the equipment military use expected operational effectiveness and operational suitability, maintenance concepts, training needs and technical manual suitability. IOTE is generally conducted at Government facilities.
Dimension	$/year
Source	PMO

Name	DGPM(I)
Description	Government project management costs incurred during full scale development in year I. This refers to the technical and administrative planning, organizing, directing, coordinating, controlling, and approval actions designed to accomplish overall program objectives. Examples of these activities are configuration management, cost/schedule management, data management, contract management, and integrated logistic support management.
Dimension	$/year
Source	PMO

Name	DGTA(I)
Description	Government costs for test site activation/deactivation during full scale development Test & Evaluation program in year I. This refers to the costs for test site modification, transportation and installation of the prototype models at the test site, test site operation, restoration and facilities leased or government facilities used during Test & Evaluation program.
Dimension	$/year
Source	PMO

Name	DGTE(I)
Description	Government personnel costs incurred during full scale development Test & Evaluation program for testing and evaluation.
Dimension	$/year
Source	PMO

Name	DGTT(I)
Description	Government costs to train students during full scale development Test & Evaluation program in year I. This refers to the pay & allowance and travel expenses and the course fees and the training facilities provided by the government.
Dimension	$/year
Source	PMO

Name	DR(I)
Description	Annual discount rate for future costs in year I.
Dimension	Ratio
Source	PMO & Analyst

Name	DSC(K)
Description	Discard rate of the Kth spare/repair item.
Dimension	Ratio
Source	PM(L) & Contractor

Name	FDRT
Description	Required stockage time for depot level repairable items at O/I and depot level.
Dimension	Days
Source	PM(L)

Name	FILS
Description	Required stockage time for replenishment spares at O/I level.
Dimension	Days
Source	PM(L)

Name	FIRT
Description	Repair cycle time of repairable items at O/I level.
Dimension	Days
Source	PM(L)

Name	FM
Description	Repair material rate.
Dimension	Ratio - (Repair material cost/Item unit cost)
Source	PM(L)

Name	FMS(I)
Description	Maintenance site construction/preparation costs during Investment period in year I.
Dimension	$/year
Source	PMO

Name	FOS(I)
Description	Operational site construction/preparation costs during Investment period in year I.
Dimension	$/year
Source	PMO

Name	FPST
Description	Procurement lead and safety level stockage time for initial spare & repair parts.
Dimension	Days
Source	PM(L)

Name	FR(I)
Description	Reliability improvement or degradation factor during year I.
Dimension	Dimensionless
Source	PM(L)

Name	IRCON(I)
Description	Annual inflation rate for future costs for construction type of funding during year I.
Dimension	Ratio
Source	Analyst

Name	IROM(I)
Description	Annual inflation rate for future costs of O&M type of funding during year I.
Dimension	Ratio
Source	Analyst

Name	IRPROC(I)
Description	Annual inflation rate for future costs of procurement type of funding during year I.
Dimension	Ratio
Source	Analyst.

Name	IRRD(I)
Description	Annual inflation rate for future costs of R&D type of funding during year I.
Dimension	Ratio
Source	Analyst

Name	ISSD(I)
Description	Storage space required for the depot inventory during year I.
Dimension	sq.ft./year
Source	PM(L) & Contractor

Name	ISSI(I)
Description	Storage space required for the O/I inventory during year I.
Dimension	sq.ft./year
Source	PM(L) & Contractor

Name	IYI
Description	Year I during which initial cost occur.
Dimension	Dimensionless
Source	PMO

Name	LO(I)
Description	Desired manning level for operating personnel during year I.
Dimension	Personnel/year
Source	PM(L) & Contractor

Name	LM(I)
Description	Desired manning level for O/I level maintenance personnel during year I.
Dimension	Personnel/year
Source	PM(L) & Contractor

Name	LP(I)
Description	Desired manning level for depot level maintenance personnel during year I.
Dimension	Personnel/year
Source	PM(L) & Contractor

Name	LPM(N)
Description	Preventive maintenance labor time for the Nth type of maintenance action.
Dimension	hrs/action
Source	PM(L) & Contractor

Name	LSD(K)
Description	Depot maintenance labor time to repair the Kth item.
Dimension	hrs/item
Source	PM(L) & Contractor

Name	LSI(K)
Description	O/I maintenance labor time to repair the Kth item.
Dimension	hrs/item
Source	PM(L) & Contractor

Name	LSO(K)
Description	O/I maintenance labor time to remove, replace the Kth item.
Dimension	hrs/item
Source	PM(L) & Contractor

Name	MPM(N)
Description	Material cost for the Nth type of preventive maintenance action.
Dimension	$/action
Source	PM(L) & Contractor

Name	MSSD(I)
Description	Shop space required for depot maintenance during year I.
Dimension	sq.ft./year
Source	PM(L) & Contractor

Name	MSSI(I)
Description	Shop space required for O/I maintenance during year I.
Dimension	sq.ft./year
Source	PM(L) & Contractor

Name	N(I)
Description	Number of equipments in the Navy's inventory system at the end of year I.
Dimension	equip/year
Source	PM(L)

Name	NC(I)
Description	Number of copies of technical data to be distributed and inventoried during year I.
Dimension	copies/year
Source	PM(L)

Name	NK
Description	Total number of spare/repair items in the prime equipment.
Dimension	Dimensionless
Source	PM(L) & Contractor

Name	NM
Description	Number of preventive maintenance types of the prime equipment.
Dimension	Dimensionless
Source	PM(L) & Contractor

Name	NN(I)
Description	Prime equipment annual acceptance schedule. Number of equipments acquired during year I.
Dimension	equip/year
Source	PMO & PM(L)

Name	NOH(I)
Description	Prime equipment overhaul schedule. Number of equipments scheduled to be overhauled during year I.
Dimension	equip/year
Source	PMO & PM(L)

Name	NP
Description	Number of pages per technical manual maintained by Navy.
Dimension	pages/copy
Source	PM(L) & Contractor

Name	NPM(N)
Description	Time between inspections of the Nth type of preventive maintenance action.
Dimension	hrs/action
Source	PM(L) & Contractor

Name	NPO(I)
Description	Prime equipment phase out schedule. Number of equipments scheduled to be phased out during year I.
Dimension	equip/year
Source	PMO & PM(L)

Name	NSNP
Description	Total number of new National Stock Numbers (NSN) to be issued on the prime equipment
Dimension	NSN
Source	PM(L) & Contractor

Name	NSNS
Description	Total number of new National Stock Numbers (NSN) to be issued on the peculiar Support & Test equipments
Dimension	NSN
Source	PM(L) & Contractor

Name	OHL
Description	Prime equipment overhaul maintenance labor time.
Dimension	hrs/equip
Source	PM(L) & Contractor

Name	OHM
Description	Prime equipment overhaul maintenance material cost.
Dimension	$/equip
Source	PM(L) & Contractor

Name	OHT
Description	Prime equipment overhaul maintenance material shipping rate.
Dimension	$/equip
Source	PM(L) & Contractor

Name	OT
Description	Prime equipment annual operating time.
Dimension	hrs/equip/year
Source	PMO

Name	PMG(I)
Description	Government project management costs incurred during the Investment period in year I. This refers to the technical and administrative planning, organizing, directing, coordinating, controlling and approval actions designed to accomplish overall program objectives. Examples of these activities are configuration management, cost/schedule management, data management, contract management, value engineering, quality assurance, and integrated logistic management.
Dimension	$/year
Source	PMO

Name	PO
Description	Number of personnel required to operate a prime equipment.
Dimension	personnel/equip
Source	PM(L)

Name	PSOS
Description	Floor space required for the operation of a prime equipment.
Dimension	sq.ft./equip
Source	PM(L) & Contractor

Name	PSS(I)
Description	Production support and services cost incurred during the Investment period of the life cycle cost. These are the supportive costs incurred during the production of the prime equipment. These costs may include engineering, facilities, production tooling and testing equipment, quality assurance, overhead costs of general and administrative expenses and contract fee. (NOTE: All or a portion of these costs may be included in the prime equipment hardware acquisition cost. If so user should be carefull not to double count the cost).
Dimension	$/year
Source	PMO

Name	PTE(I)
Description	Production Test and Evaluation costs incurred during Investment period in year I. These costs refer to Production Acceptance Test (PATE) and Operation Acceptance Test (OTE). Production Acceptance Tests are conducted on production items produced early in the production run. They are designed to assure that production equipments conform to design specifications and performance requirements when manufactured in accordance with production specifications. Operational tests are conducted by user personnel under the conditions of the operational tactical environment. They are designed to determine the equipment operational effectiveness and validate organization doctrine, tactics, training requirements and logistic support.
Dimension	$/year
Source	PMO

Name	PTI(I)
Description	Number of instructors to receive initial training during year I.
Dimension	student/year
Source	PN(L)

Name	PTM(I)
Description	Number of O/I maintenance personnel to receive initial training during year I.
Dimension	student/year
Source	PN(L)

Name	PTO(I)
Description	Number of Operating personnel to receive initial training during year I.
Dimension	student/year
Source	PN(L)

Name	PTP(I)
Description	Number of depot maintenance personnel to receive initial training during year I.
Dimension	student/year
Source	PM(L)

Name	QTY(K)
Description	Number of quantities of Kth spare/repair item
Dimension	quantity/item
Source	PM(L)

Name	R(K)
Description	Mean Time Between Failures of the Kth spare/repair item.
Dimension	hrs/failure
Source	PM(L)

Name	RAM
Description	Operator and O/I level maintenance personnel attrition rate.
Dimension	ratio
Source	PM(L)

Name	RAP
Description	Depot level maintenance personnel attrition rate.
Dimension	ratio
Source	PM(L)

Name	RDM
Description	Technical data management costs for file maintenance.
Dimension	$/page/year
Source	PM(L)

Name	RIE
Description	Average National Stock Number (NSN) entry cost into the supply system.
Dimension	$/NSN
Source	PM(L)

Name	RIM
Description	Supply support management item retention and field administration cost.
Dimension	$/NSN
Source	PM(L)

Name	RO
Description	Prime equipment operator pay rate.
Dimension	$/hr/man
Source	PM(L)

Name	RPL
Description	Packaging labor cost.
Dimension	$/#
Source	PM(L)

Name	RPM
Description	Packaging material cost.
Dimension	$/#
Source	PM(L)

Name	RSD
Description	Depot maintenance personnel pay rate to repair failed items.
Dimension	$/hr/man
Source	PM(L)

Name	RSL
Description	O/I maintenance personnel pay rate to remove replace or repair failed items.
Dimension	$/hr/man
Source	PM(L)

Name	RSR
Description	Average shipping Cost.
Dimension	$/#
Source	PM(L)

Name	RSS(K)
Description	Fraction of failures repaired at the intermediate maintenance level. This value lies inclusively between "0" and "1". "0" refers to all depot repair and 1 refers to all intermediate depot repair.
Dimension	ratio
Source	PM(L) & Contractor

Name	RW(K)
Description	Ratio of the shipping weight to the unpacked weight of the Kth item.
Dimension	ratio
Source	PM(L) & Contractor

Name	STE(I)
Description	Support & Test equipment acquisition costs incurred during Investment period in year I. This refers to the Support & Test equipments required to maintain and care for the prime equipment while not directly engaged in the performance of its mission. This includes vehicles, equipment and tools used to service transport and hoist, repair, overhaul, assemble, disassemble, test, inspect or otherwise maintain the mission equipment. This also includes the software costs associated with the Support & Test equipment.
Dimension	$/year
Source	PMO

Name	STEM
Description	Support & Test equipment initial support rate. Percent of S&TE acquisition cost
Dimension	ratio
Source	PM(L)

Name	STES
Description	Support & Test equipment recurring support cost.
Dimension	$/Prime Equipment
Source	PM(L)

Name	W(K)
Description	Unpacked weight of the Kth spare/repair item.
Dimension	#/item
Source	PM(L) & Contractor

Name	TERM
Description	Termination cost and/or value of the prime equipment.
Dimension	$/equip
Source	PM(L)

Name	Y
Description	Total number of years covered by the life cycle cost analysis.
Dimension	dimensionless
Source	PMO

APPENDIX E

SAMPLE NAVY WEAPONS CBS AND EQUATIONS

Reference: Life Cycle Cost Guide for Major Weapons Systems, Naval Weapons Support Activity, Engineering Management Department, Cost Management Division, November 1977.

Appendix E

SAMPLE Navy Weapons CBS and Equations

This appendix contains a listing of the sample cost breakdown structure provided by the Navy for their weapons model. Following the CBS is a detailed listing of each equation and each equation cost factor (variable).

E. FLEX WEAPONS MODEL

000000	TOTAL LIFE CYCLE
100000	RESEARCH AND DEVELOPMENT
110000	Validation
111000	Contractor
112000	Government
120000	Full Scale Development
121000	Contractor
121100	Program Management
121200	Engineering
121300	Prototype Hardware
121400	Software
121500	Integration and Test
121600	Documentaion
122000	Government
122100	Project Management
122200	Systems Engineering
122300	System Test and Evaluation
122310	Test Personnel and Training
122320	Test Spares
122330	Test AGE/GSE/TE
122340	Test Facilities
122400	Foreign Military Sales Benefit
200000	INVESTMENT
210000	Acquisition (Contractor)
211000	Production Hardware
212000	Peculiar Support Equipment
213000	Training
214000	Integration and Test
215000	Program Management
216000	Documentation
217000	Technical Support
218000	Industrial Facilities
219000	Initial Spares and Repair Parts
220000	Government
221000	GFE/GFM
222000	Common Support Equipment
223000	Training
224000	System Test and Evaluation
225000	Project Management
226000	Documentation
227000	Operational/Site Activation
228000	Supply Introduction
229000	Transportation

300000 OPERATING AND SUPPORT
310000 Operations
311000 Operational Personnel (Crew)
312000 Operational Consumables
312100 Material
312200 POL
312300 Expendable Stores
312400 Utilities
320000 Support
321000 Contractor
321100 Factory Repair
321200 Factory RIW/FFW
321300 Factory Rework/Overhaul
321400 Technical Services
322000 Government
322100 Maintenance Personnel
322200 Support of Support Equipment
322300 Training
322400 Updates & Modifications
322410 Documentation Updates
322420 Software Updates
322430 System/Sub System Modifications
322500 Maintenance Facilities
322600 Supply Support
322610 Replenishment Spares and Repair Parts
322620 Supply Management
322700 Depot Rework/Overhaul
322800 Transportation
322810 Transportation Unscheduled
322820 Transportation Scheduled
330000 Termination

1. Research and Development Costs

Definition:

Research and development costs refer to all costs associated with the research, development, test and evaluation of the system/equipment. Specifically, this covers all costs during the validation and full scale development phase of the program. This category includes costs for engineering design, development, fabrication, assembly and test of engineering prototype models; initial system evaluation; and associated documentation. The costs incurred in this category terminate with the satisfactory completion of the Initial Operational Test and Evaluation and Government's approval for Service use.

Cost Formula:

$$RD = VC + FSD$$

where:

RD = Research and development costs. ($)

VC = Validation costs. ($)

FSD = Full scale development costs. ($)

1.1 Validation Costs

Definition

This subcategory refers to all costs associated with the efforts categorized as "Validation." These efforts include validation of the selected technical approach and costs, performance predictions, schedules and military requirements being made.

Cost Formula:

$$VC = CV + GV$$

where:

VC = Validation costs. ($)

CV = Contractor validation cost. ($)

GV = Government validation cost. ($)

1.11 Contractor Validation Cost

Definition:

This element includes that portion of the validation cost incurred by private business while under contract with the Government.

Cost Formula:

$$CV = \sum_{I=1}^{Y} ADC(I)$$

where:

CV = Contractor validation cost. ($)

ADC(I) = Contractor payments paid by the Government to contractors for the major weapon system validation effort during year I. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

1.2 Full Scale Development Costs

Definition:

This subcategory refers to all costs associated with the efforts categorized as "Engineering Development" within the Department of the Navy. Engineering developments are those development programs being engineered for Service use, but which have not yet been approved for procurement or operation.

Cost Formula:

FSD = CFS + GFS

where:

FSD = Full scale development costs. ($)

CFS = Contractor full scale development costs. ($)

GFS = Government full scale development costs. ($)

1.21 Contractor Full Scale Development Costs

Definition:

The costs included in this subcategory shall be limited to the contractual full scale development costs. These include:

1.2101 Program Management

1.2102 Engineering

1.2103 Prototype Hardware

1.2104 Software

1.2105 Integration and Test

1.2106 Documentation

In addition, the overhead cost of general and administrative expenses and contract fee shall be included.

Cost Formula:

$$CFS = CM + CE + PH + CS + CI + CD$$

where:

CFS = Contractor full scale development costs. ($)

CM = Contractor full scale development program management cost. ($)

CE = Contractor engineering cost. ($)

PH = Contractor prototype hardware cost. ($)

CS = Contractor software development cost. ($)

CI = Contractor integration and test cost. ($)

CD = Contractor full scale development documentation cost. ($)

1.211 Program Management Cost

Definition:

This element refers to the technical and administrative planning, organizing, directing, coordinating, controlling and approval actions designed to accomplish overall program objectives during the full scale development phase of the equipment life cycle. Examples of these activities are configuration management, cost/schedule management, data assurance and integrated logistics support management.

Cost Formula:

$$CM = \sum_{I=1}^{Y} DCPM(I)$$

where:

CM = Contractor full scale development program management cost. ($)

DCPM(I) = Contractor payments paid by the Government to contractors for program management during year I for the full scale development effort. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

1.2.1.2 Engineering Cost

Definition:

This element refers to all engineering efforts associated with the system/equipment design and development. Specifically, this includes the cost of systems engineering and integration, design engineering (electrical, mechanical, drafting, etc.), design support (reliability, maintainability, human factors engineering and safety, value engineering, microelectronics), and the redesign or formulation of engineering changes. It includes the cost of direct labor, materials, overhead and other direct costs which must be incurred during the engineering process.

Cost Formula:

$$CE = \sum_{I=1}^{Y} DCE(I)$$

where:

CE = Contractor engineering cost ($)

DCE(I) = Contractor payments paid by the Government to contractors for engineering during year I for the full scale development effort. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

1.213 Prototype Hardware Cost

Definition:

This element refers to the fabrication and assembly of full scale development prototype models in support of the engineering design activity. Specifically, this includes the cost of direct labor, materials and overhead associated with material procurement and handling in support of manufacturing, fabrication, assembly, system integration, and checkout.

Cost Formula:

$$PH = \sum_{I=1}^{Y} DCH(I)$$

where:

PH = Contractor prototype hardware cost. ($)

DCH(I) = Contractor payments paid by the Government to contractors for prototype hardware during year I for the full scale development effort. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

1.214 Software Cost

Definition:

This element refers to the effort associated with the development of computer software. Cost of computer time is also contained herein.

Cost Formula:

$$CS = \sum_{I=1}^{Y} DCS(I)$$

where:

CS = Contractor software development cost. ($)

DCS(I) = Contractor payments paid by the Government to contractors for development of software during year I for the full scale development effort. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

1.215 Integration and Test Cost

Definition:

This element includes the cost of integrating the subsystems into a complete weapon system. It also includes that portion of the test cost incurred by private business while under contract with the Government. Test cost refers to those costs which are incurred in support of the Government testing (TECH/OPEVAL), during the full scale development phase of the equipment life cycle.

Cost Formula:

$$CI = \sum_{I=1}^{Y} DCTE(I)$$

where:

CI = Contractor integration and test cost. ($)

DCTE(I) = Contractor payments paid by the Government to contractors for integrating and testing the weapon system during year I for the full scale development effort. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

1.216 Documentation Cost

Definition:

The documentation element refers to all deliverable data acquired during Full Scale Development. The cost includes the effort for acquiring, writing, assembling, reformatting, production, packaging and shipping the following:

a. Engineering Data - Engineering drawings, associated lists, specifications, and other documentation required by the Government. Additionally, all plans, procedures, reports and documentation pertaining to systems, subsystems, component engineering, and testing.

b. Support Data - Data items required by the Government to develop and acquire the Support System. This includes maintenance data, provisioning data and lists, support and test equipment data and lists, logistics support plans and progress reports, technical publications requirements data, training plan data and transportation and handling data, etc.

c. Management Data - Data items necessary for configuration management, cost, schedule, contractual data management, programs management, etc., required by Government.

Cost Formula

$$CD = \sum_{I=1}^{Y} DCD(I)$$

where:

CD = Contractor full scale development documentation cost. ($)

DCD(I) = Contractor payments paid by the Government to contractors for documentation during year I for the full scale development effort. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

1.22 Government Full Scale Development Costs

Definition:

The costs included in this subcategory include:

1.2201 Project Management

1.2202 Systems Engineering

1.2203 System Test and Evaluation

1.2204 Foreign Military Sales Benefit

Cost Formula:

GFS = PM + SE + STE + FMS

where:

GFS = Government full scale development costs. ($)

PM = Government full scale development project management cost. ($)

SE = Government systems engineering cost. ($)

STE = Government full scale development system test and evaluation costs. ($)

FMS = Foreign military sales benefit. ($)

1.221 Project Management Cost

Definition:

This element refers to the technical and administrative planning, organizing, directing, coordinating, controlling, and approval actions designed to accomplish overall program objectives during the full scale development phase of the equipment life cycle. Examples of these activities are configuration management, cost/schedule management, data assurance and integrated logistics support management.

Cost Formula:

$$PM = \sum_{I=1}^{Y} DGPM(I)$$

where:

PM = Government full scale development project management cost. ($)

DGPM(I) = Government expenditures during year I for project management for the full scale development effort. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

1.222 Systems Engineering Cost

Definition:

The systems engineering element refers to the technical and management efforts of directing and controlling a totally integrated engineering effort of a system program. This element encompasses the system engineering effort to define the system and the integrated planning and control of the technical program efforts of design engineering, logistics engineering, specialty engineering, production engineering, and integrated test planning. This element includes but is not limited to: the system engineering effort to transform an operational need or statement of deficiency into a description of system requirements and a perferred system configuration; the logistics engineering effort to define, optimize and integrate the logistics support considerations into the mainstream engineering effort to insure the development and production of a supportable and cost effective weapon system; and the technical planning and control effort for planning, monitoring, measuring, evaluating, directing and replanning the management of the technical program. It excludes the actual design engineering, and production engineering directly related to the products or services of a deliverable end item. Examples of system engineering efforts include:

a. System definition, overall system design, design integrity analysis, system optimization, system/cost effectiveness analysis, and intrasystem and intersystem compatibility assurance, etc., the integration and balancing of reliability, maintainability, producibility, safety, and survivability; human factors, personnel and training program requirements, security requirements, configuration identification and control, quality assurance program, value engineering, preparation of equipment and component performance specifications, design of test and demonstration plans;

b. Support synthesis, design impact projections, life cycle cost factors, time factors, tradeoff analysis, logistics design appraisal, use studies, support function requirements identification, repair level determination, task analysis, standardization review, logistics requirements identification, logistics support verification, and the preparation and updating of the logistics support plan, the maintenance plan, facilities planning (operational and maintenance), the transportation and handling plan, etc., and:

c. Preparation of the Systems Engineering Management Plan (SEMP), specification tree, program risk analysis, system test planning, decision control process, technical performance measurement, technical reviews, subcontractor/vendor reviews, work authorization, technical documentation control, etc.

Cost Formula:

$$SE = \sum_{I=1}^{Y} DCSE(I)$$

where:

SE = Government systems engineering cost. ($)

DCSE(I) = Government expenditures during year I for systems engineering for the full scale development effort. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

1.223 System Test and Evaluation Costs

Definition:

System test and evaluation costs refer to those costs which are incurred with the Navy for testing and evaluation (TECH/OPEVAL) of the prototype system during the full scale development phase. The costs included in this subcategory include:

1.22031 Test Personnel and Training

1.22032 Test Spares

1.22033 Test AGE/GSE/TE

1.22034 Test Facilities

Cost Formula:

STE = TP + TS + TE + TF

Where:

STE = Government full scale development system test and evaluation costs. ($)

TP = Government test personnel and training cost. ($)

TS = Government test spares cost. ($)

TE = Government test equipment costs. ($)

TF = Government test facilities cost. ($)

1.2231 Test Personnel and Training Cost

Definition:

This element refers to Government expenditures necessary to insure that trained personnel are available to conduct tests and evaluate the prototype during full scale development. It includes tha pay & allowance and travel expenses, the course fees and training facilities provided by the Government.

Cost Formula:

$$TP = \sum_{I=1}^{Y} DGTT(I)$$

where:

TP = Government test personnel and training cost. ($)

DGTT(I) = Government expenditures during year I for test personnel and training cost for the full scale development effort. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

1.2232 Test Spares Cost

Definition:

This element refers to the spare equipments, modules, sub-assemblies and components used for maintenance replacement purposes in end items of the prototype equipment. Its purpose is to provide the necessary items to insure operation of the prototype system during the test and evaluation period.

Cost Formula:

$$TS = \sum_{I=1}^{Y} DCTS(I)$$

where:

TS = Government test spares cost. ($)

DCTS(I) = Government expenditures during year I for test spares for the full scale development effort. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

1.2233 Test AGE/GSE/TE Cost

Definition:

This element is for the costs of Aerospace Ground Equipment (AGE), Ground Support Equipment (GSE), and Test Equipment (TE) used for testing and evaluation of the prototype system during the full scale development phase.

Cost Formula:

$$TE = \sum_{I=1}^{Y} DCT(I)$$

where:

TE = Government test equipment costs. ($)

DCT(I) = Government expenditures during year I for AGE/GSE/TE used in support of the Test & Evaluation program during the full scale development phase. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

1.2234 Test Facilities Cost

Definition:

This element refers to Government costs for test site activation/deactivation during full scale development Test & Evaluation program in year I. This refers to the costs for test site modification, transportation and installation of the prototype models at the test site, test site operation, restoration and facilities leased or government facilities used during Test & Evaluation program.

Cost Formula:

$$TF = \sum_{I=1}^{Y} DGTA(I)$$

where:

TF = Government test facilities cost. ($)

DGTA(I) = Government costs for test site activation/deactivation during full scale development Test & Evaluation program in year I. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

1.2.4 Foreign Military Sales Benefit

Definition:

This element refers to the cost benefits realized by the Government due to the sale of previously developed weapon systems to foreign countries. Moneys received from these sales may be used by the Government to help defray the R&D cost of the major weapon system under analysis.

Cost benefits may be realized by the foreign military sales of the weapon system under analysis during the production phase. This is caused by the lower unit production costs achieved by the manufacturing of larger quantities.

Cost Formula:

$$FMS = \sum_{I=1}^{Y} FM(I)$$

where:

FMS = Foreign military sales benefit. ($)

FM(I) = Moneys received by the Government from the foreign military sales of previously developed weapon systems, to defray the R&D cost of the major weapon system.

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

2. Investment Costs

Definition:

Investment costs refer to all costs associated with the production of system/equipments. This category includes costs for management; materials, farication, assembly, and test of the production units; initial logistics support requirements (e.g., spare provisioning, support equipment and tools, technical publications, initial training, facility construction, etc.) and installation and checkout of the system/equipment for operational use. The costs incurred in this category terminate with the satisfactory turnover of an operationally usable system to the using command or organization.

Cost Formula:

$$IN = AQ + GO$$

where:

IN = Investment costs. ($)

AQ = Acquisition costs. ($)

GO = Government investment costs. ($)

2.1 Acquisition Costs

Definition:

The costs included in this subcategory include:

2.11 Production Hardware

2.12 Peculiar Support Equipment

2.13 Training

2.14 Integration and Test

2.15 Program Management

2.16 Documentation

2.17 Technical Support

2.18 Industrial Facilities

2.19 Initial Spares and Repair Parts

In addition, the overhead cost of general and administrative expenses and contract fee shall be included.

Cost Formula:

$$AQ = APH + PSE + AT + AI + APM + ADO + ATS + AIF + ASRP$$

where:

AQ = Acquisition costs. ($)

APH = Acquisition production hardware cost. ($)

PSE = Acquisition peculiar support equipment cost. ($)

AT = Acquisition training cost. ($)

AI = Acquisition integration and test cost. ($)

APM = Acquisition program management cost. ($)

ADO = Acquisition documentation cost. ($)

ATS = Acquisition technical support cost. ($)

AIF = Acquisition industrial facilities cost. ($)

ASRP = Acquisition initial spares and repair parts cost. ($)

2.11 Production Hardware Cost

Definition:

This cost element includes those production costs incurred by a private business while under contract with the Federal Government, that occur with each unit produced. These costs tend to be subject to a learning curve concept in which the cost per unit decreases as quantity increases. Appendix 1 presents theory of the learning curve concept.

Costs included in this element are:

Manufacturing - Direct labor, overhead and other direct charges incurred during the fabrication, processing, subassembly, final assembly, reworking, modification and installation of parts and equipment to an end item of equipment.

Production Material - All the purchased equipment and parts, subcontracted items and other material that is used in the production of the prime mission equipment. It includes, but is not limited to, raw and processed material, parts, components, assemblies, and small tools and supplies which may be consumed in normal use during the manufacturing process.

Purchased Equipment and Parts - The cost of manufactured and assembled items, usually procured from outside sources by the contractor. Purchased equipment usually costs in excess of $100 per unit and exhibits a wide range of complexity. It is usually termed off-the-shelf equipment and consists of, for example, batteries, motors, generators, air conditioning equipment, hydraulic pumps and instruments. Purchased parts are distinguished from purchased equipment by cost and complexity. Usually, purchased parts cost under $100 per unit and are essentially standard, off-the-shelf hardware items.

Subcontracted Items - The cost of parts, components, and assemblies produced by manufacturers other than the prime contractor in accordance with the prime contractor's design, specifications or directions. It does not include equipment bought off-the-shelf. It does include the cost of transportation or shipment if itemized by the subcontractor.

Other Material - All the raw and semifabricated material, intercompany transfers and other material used in the production of the equipment.

Sustaining Engineering - All engineering performed after quantity production starts in included in this element. This will include such items as maintainability-reliability engineering, maintenance engineering, value engineering, and production engineering. It also includes redesign, evaluation, and other sustaining efforts of the engineering function.

Quality Control and Inspection - This includes such tasks as receiving inspection, in-process and final inspection of tools, parts, subassemblies and complete assemblies. Quality Control is that function of management relative to all procedures, inspections, examinations, and tests required during procurement, production, receipt, storage, and issue that are necessary to provide the user with an item of the required quality.

2.11 (Continued)

Cost Formula:

$$APH = \sum_{I=1}^{Y} PH(I)$$

where:

APH = Acquisition production hardware cost. ($)
PH(i) = Production hardware costs during year I. ($/YR)
I = Designator for a specific project year.
Y = Number of years in life cycle. (YRS)

2.12 Peculiar Support Equipment Cost

Definition:

This element refers to the costs for Organizational level, Intermediate level, Prime Intermediate Maintenance Activity level, and depot level support and test equipments, including costs for design, material, fabrication, tooling, and unit test for all the items. Also included are the materials and services involved with the installation of the support and test equipments.

The support and test equipment refers to the equipment, including tools, required to maintain and care for the system or portions of the system while not directly engaged in the performance of its mission, and which have application peculiar to a given defense material item. This includes, vehicles, equipment, and tools used to service, transport and hoist, repair, overhaul, assemble, disassemble, test, inspect, or otherwise maintain the mission equipment.

Cost Formula:

$$PSE = \sum_{I=1}^{Y} \sum_{C=1}^{D} NSE(I,C) * CSE(C)$$

where:

PSE = Acquisition peculiar support equipment cost. ($)

NSE (I,C) = Total population of support equipments of type C during year I. (equipments/yr)

CSE (C) = Acquisition cost of support equipment type C. ($/equipment)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

2.13 Training Cost

Definition:

This element refers to factory training provided by contractors at their facilities to qualify an initial cadre of skilled personnel to: (1) operate and maintain the weapon system when operationally deployed or (2) initially man the Navy Department's weapon system related courses. This includes all efforts associated with the design, development, and production of training equipment as well as the execution of training services.

Equipment - refers to those distinctive end items of training equipment required to meet specific training objectives. This element includes: for example, operational trainers (i.e., simulators), maintenance trainers, and other items such as cutaways, mockups, and models.

Services - refers to services, devices, accessories, and aids necessary to accomplish the objectives of training. This includes; for example, training plans, training aids, training course materials, new equipment training, etc.

Cost Formula:

$$AT = \sum_{I=1}^{Y} CTE(I) + CTS(I)$$

where:

AT = Acquisition training cost. ($)

CTE(I) = Cost of contractor training equipment in year I. ($/yr)

CTS(I) = Cost of contractor training services in year I. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

2.14 Integration and Test Cost

Definition:

This element refers to the effort of technical and functional activities associated with the design, development, and production of mating surfaces, structures, equipments, parts, and materials required to assemble the major subsystems into a major weapon system as a whole. Integration and test includes all effort associated with:

a. The development of engineering layouts, determination of overall design characteristics, and determination of requirements of design review.

b. The set up, conduct and review of testing assembled components or subsystems prior to installation.

c. The detailed production design.

d. Inspection activities related to receiving, factory and vendor liaison.

e. Design maintenance effort.

f. Quality planning and control.

g. Tooling (planning, design and fabrication)

h. Administrative engineering.

i. The joining or mating and final assembly of level 3 equipment elements to form a complete prime mission equipment when the effort is performed at the manufacturing facility.

j. The conduct of production acceptance testing.

Cost Formula:

$$AI = \sum_{I=1}^{Y} CIT(I)$$

where:

AI = Acquisition integration and test cost. ($)

CIT(I) = Contractor payments paid by the Government during year I for integration and test of the complete weapon system. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

2.15 Program Management Cost

Definition:

This element refers to the technical and administrative planning, organizing, directing, coordinating, controlling, and approval actions designed to accomplish overall program objectives during the investment phase of the equipment life cycle. Examples of these activities are configuration management, cost/schedule management, data management, contract management, liaison, value engineering, quality assurance and integrated logistics support management.

Cost Formula:

$$APM = \sum_{I=1}^{Y} CPM(I)$$

where:

APM = Acquisition program management cost. ($/yr)

CPM(I) = Contractor payments paid by the Government during year I for program management of the production units. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

2.16 Documentation Cost

Definition:

The data element refers to all deliverable data acquired during the investment phase which is required to be listed on a DD Form 1423. The data requirements will normally be selected from the departmental or agency Authorized Data List. It includes the effort for acquiring, writing, assembling, reformatting, reproduction, packaging and shipping.

It includes the following items:

a. Technical Publications

b. Engineering Data

c. Management Data

d. Support Data

Technical Publications - This element refers to those handbooks, technical manuals, technical orders, technical data sheets, etc., required by the Government.

Engineering Data - The engineering data element refers to those engineering drawings, associated lists, specifications, and other documentation required by the Government. This element includes all plans, procedures, reports and documentation pertaining to systems, subsystems, and components engineering and testing.

Management Data - The management data element refers to those data items necessary for configuration management, cost, schedule, contractual data management, programs management, etc., required by the Government.

Support Data - The support data element refers to those data items required by the Government to develop and acquire the Support System. This includes maintenance data, provisioning data and lists, support and test equipment data and lists, logistics support plans and progress reports, technical publications requirements data, training planning data and transportation and handling data, etc.

Cost Formula:

$$ADO = \sum_{I=1}^{Y} AD(I)$$

where:

ADO = Acquisition documentation cost. ($)

AD(I) = Documentation acquisition cost during year I. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

2.17 Technical Support Cost

Definition:

This element refers to those costs which are incurred in support of Government testing (PATE and OTE) during the investment phase of the equipment life cycle.

Production Acceptance Test and Evaluation (PATE) Support - The production acceptance tests are conducted on production items produced early in the production run (generally identified as the "initial production run"). They are designed to assure that production systems and equipment conform to design specifications and performance requirements when manufactured in accordance with production specifications and quantity production processes.

Operational Test and Evaluation (OTE) Support - User Operational Tests and Evaluation (OTE) are tests generally conducted by user personnel (military unit(s)) under conditions of operational tactical environments. They are designed to determine the system/equipment operational effectiveness and validate organization doctrine, tactics, basis of issue, training requirements and logistics support.

Cost Formula:

$$ATS = \sum_{I=1}^{Y} CSU(I)$$

where:

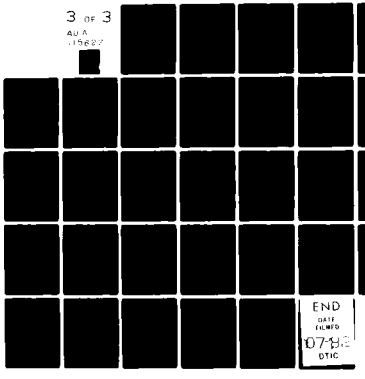
ATS = Acquisition technical support cost. ($)

CSU(I) = Government payments to contractors for technical support during year I of the investment phase. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

AD-A115 622 NAVAL WEAPONS ENGINEERING SUPPORT ACTIVITY WASHINGTON DC F/G 5/1
USER'S GUIDE FOR NAVAL MATERIAL COMMAND'S LIFE CYCLE COST (FLEX--ETC(U)
APR 82 R DRESS, T STRUVEN
UNCLASSIFIED NMAT/LCC-FLEX9E DOD-DF-82-007A NL



2.13 Industrial Facilities Cost

Definition:

The industrial facilities element refers to the construction, conversion, or expansion of facilities for production, inventory, and contractor depot maintenance required by one or more suppliers for the specific system. This element includes; for example, equipment acquisition, or modernization, where applicable, and maintenance of the above facilities or equipment.

Construction/conversion/expansion - refers to the real estate and preparation of system peculiar facilities for production, inventory, depot maintenance, and other related activities.

Equipment acquisition or modernization - refers to production equipment acquisition, modernization, or transferal of equipment for the particular system. (Pertains primarily to government owned and leased equipment under facilities contract.)

Maintenance (industrial facilities) - refers to the maintenance, preservation, and repair of industrial facilities and equipment.

Cost Formula:

$$AIF = \sum_{I=1}^{Y} CIF(I)$$

where:

AIF = Acquisition industiral facilities cost. ($)

CIF(I) = Government payments to contractors for industrial facilities during year I. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

2.19 Initial Spares and Repair Parts Cost

Definition:

The initial spares and repair parts element refers to the initial provisioning of modules, assemblies, and spare components to be used for maintenance replacement purposes in end items of equipment and for repair of end items. Its purpose is to provide the necessary items to operate and maintain the equipment until the supply system comes into routine operation. Quantitative requirements for initial spare and repair parts are determined through logistics support analysis, and are based on the System Stock Requirement and the Total Allowance Quantity.

Cost Formula:

$$ASRP_s = \sum_{I=1}^{Y} NN(I) * CSPS + SS(I) \qquad \text{for ship systems}$$

$$ASRP_a = \sum_{I=1}^{Y} NB(I) * CSPB + SS(I) \qquad \text{for aircraft systems}$$

where:

$ASRP_s$ = Acquisition initial spare and repair parts cost for ship systems.

$ASRP_a$ = Acquisition initial spare and repair parts cost for aircraft systems.

NN(I) = Number of weapon systems introduced into inventory during year I. (systems/yr)

CSPS = Cost of initial spares and repair parts per ship system. ($/system)

SS(I) = Cost of system stock for year I. ($)

NB(I) = Number of newly introduced bases supporting aircraft during year I. (bases)

CSPB = Cost of initial spares and repair parts per aircraft supporting base. ($/base)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

2.2 Government Costs

Definition:

The costs included in this subcategory include:

2.21 GFE/GFM

2.22 Common Support Equipment

2.23 Training

2.24 System Test and Evaluation

2.25 Project Management

2.26 Documentation

2.27 Site Activation

2.28 Supply Introduction

2.29 Transportation

Cost Formula:

$$GO = GFE + GSE + GT + GTE + GPM + GD + GOSA + GSI + GTR$$

where:

GO = Government investment costs. ($)

GFE = GFE/GFM cost. ($)

GSE = Government common support equipment cost. ($)

GT = Government training cost. ($)

GTE = Government system test and evaluation cost. ($)

GPM = Government project management cost. ($)

GD = Government documentation cost. ($)

GOSA = Government site activation costs. ($)

GSI = Government supply introduction cost. ($)

GTR = Government transportation cost. ($)

2.2 GFE/GFM Cost

Definition:

This element refers to the cost of material and equipment supplied by the Government ot the contractor(s) in the production of an end item of equipment.

Cost Formula:

$$GFE = \sum_{I=1}^{Y} NN(I) * GF$$

where:

GFE = GFE/GFM cost. ($)

NN(I) = Number of weapon systems introduced into inventory during year I. (systems/yr)

GF = Cost of GFE/GFM per weapon system. ($/weapon system)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

2.22 Common Support Equipment Cost

Definition:

This element refers to the cost of those items required to support and maintain the weapon system or portions of the system while not directly engaged in the performance of its mission, and which are presently in the DOD inventory for support of other systems. This element includes all effort required to assure availability of this equipment for support of the particular weapon system. It also includes the acquisition of additional quantities of these equipments if caused by the introduction of the weapon system into operational service.

This element should include all requirements at organizational/ intermediate and depot levels of maintenance.

Cost Formula:

$$GSE = \sum_{I=1}^{Y} ASE(I) + AQSE(I)$$

where:

GSE = Government common support equipment cost. ($)

ASE(I) = Government expenditures in year I to make common support equipment available for support of the weapon system. ($/yr)

AQSE(I) = Government expenditures in year I for the acquisition of common support equipment. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

2.23 Training Cost

Definition:

This element refers to training services, devices, accessories, aids, equipment, and parts used to facilitate instruction through which personnel will acquire sufficient concepts, skills, and aptitudes to operate and maintain the system with maximum efficiency. This element includes all effort associated with the design, development, and production of training equipment as well as the execution of training services.

The cost included in this element are:

Equipment
Services
Facilities

Equipment - refers to those distinctive end items of training equipment required to meet specific training objectives. This element includes: operational trainers, maintenance trainers and other items such as cutaways, mockups, and models.

Services - refers to services, devices, accessories, and aids necessary to accomplish the objectives of training. This element includes: training plans, training aids, training course materials, new equipment training, etc.

Facilities - refers to that special construction necessary to accomplish the objectives of training. (Primarily, the brick-and-mortar-type facility constructed solely for the training mission.)

Cost Formula:

$$GT = \sum_{I=1}^{Y} TRE(I) + TRS(I) + TRF(I)$$

where:

GT = Government training cost. ($)

TRE(I) = Government expenditures in year I for training equipment. ($/yr)

TRS(I) = Government expenditures in year I for training services. ($/yr)

TRF(I) = Government expenditures in year I for training facilities. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

2.24 System Test and Evaluation Cost

Definition

This element refers to costs which are incurred for Production Acceptance Test and Evaluation (PATE) and Operational Test and Evaluation (OTE). PATE are conducted on production items produced early in the production run. They are designed to assure that production equipments conform to design specifications and performance requirements when manufactured in accordance with production specifications. Operational tests are conducted by user personnel under the conditions of the tactical environment. They are designed to determine the equipment operational effectiveness and validate organization doctrine, tactics, training requirements and logistics support.

Cost Formula:

$$GTE = \sum_{I=1}^{Y} PTE(I)$$

where:

GTE = Government system test and evaluation cost. ($)

PTE(I) = Test and evaluation costs incurred in year I. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

2.25 Project Management Cost

Definition:

This element refers to the technical and administrative planning, organizing, directing, coordinating, controlling and approval actions designed to accomplish overall program objectives. Examples of these activities are configuration management, cost/schedule management, data management, contract management, value engineering, quality assurance, and integrated logistics management.

Cost Formula:

$$GPM = \sum_{I=1}^{Y} PMG(I)$$

where:

GPM = Government project management cost. ($)

PMG(I) = Government project management cost incurred during year I. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

2.26 Documentation Cost

Definition:

This element refers to the costs to the Government for storing, reproducing, packaging and shipping technical and managerial data.

Cost Formula:

$$GD = \sum_{I=1}^{Y} DC(I)$$

where:

GD = Government documentation cost. ($)

DC(I) = Government expenditures in year I for storing, reproducing, packaging and shipping technical and managerial data. ($/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

2.27 Operational/Site Activation Costs

Definition:

This element refers to the real estate, construction, conversion utilities, and equipment to provide all facilities required to house, service, and launch prime mission equipment. It also includes contractor support.

Cost Formula:

$$GOSA = \sum_{I=1}^{Y} FOS(I)$$

where:

GOSA = Government site activation costs. ($)
FOS(I) = Government expenditures in year I for operational/site activation costs. ($/YR)
I = Designator for a specific project year.
Y = Number of years in life cycle. (YRS)

2.28 Supply Introduction Cost

Definition:

This element refers to the management costs for entering an item introduced into the supply system by the prime equipment and support systems, in inventory. The costs include identification, description, submission to and screening and editing by Data Documents Center, and inclusion in maintenance supply catalogs.

Cost Formula:

$$GSI = \sum_{I=\overline{IYI}}^{IYI} (NSNP + NSNS) * RIE$$

where:

GSI = Government supply introduction cost. ($)

NSNP = Number of new National Stock Numbers (NSN) introduced into supply system by the major weapon system. (NSN's)

NSNS = Number of new NSN's introduced into supply system by support systems of the major weapon system. (NSN's)

RIE = Average NSN entry into the supply system cost. ($/NSN)

I = Designator for a specific project year.

IYI = Year I during which initial costs occur.

2.29 Transportation Cost

Definition

This refers to the cost associated with transporting the weapon system from the point of procurement, production, or testing to the first destination point.

Cost Formula:

$$GTR = \sum_{I=1}^{Y} NN(I) * CTPE$$

where:

GTR = Government transportation cost. ($)

NN(I) = Number of weapon systems introduced into inventory during year I. (systems/yr)

CTPE = First destination transportation cost for the weapon system. ($/system)

I = Designator for a specific project year.

Y = Number of years in life cycle. (yrs)

3. Operating and Support Costs

Definition:

Operating and support costs refer to all costs associated with the operation and logistics support of the system subsequent to equipment turnover to the using command or organization. Specifically, this covers all Government ownership costs including operation costs, maintenance costs, and logistics support costs.

Operation costs refer to all costs associated with the direct operation of the system. This includes all costs of electrical power, consumable materials and operational personnel. Maintenance and support costs refer to all costs associated with the maintenance and supply support of the system during the system's operational life.

Cost Formula:

OS = OP + SUP*

where:

OS = Operating and support costs. ($)
OP = Operations cost. ($)
SUP = Support cost. ($)

3.1 Operations Costs

Definition:

The cost of manpower, fuel, material, and other operating expenses chargeable to the non-maintenance activities of the weapon system including contractual support.

Cost Formula:

OS = CRW + OC

where:

OS = Operations costs. ($)
CRW = Operational personnel (Crew) cost. ($)
OC = Operational consumables cost. ($)

3.11 Operational Personnel (Crew) Costs

Definition:

The cost of pay and allowances of personnel required to man the weapon system; and the cost associated with the temporary assignment of personnel away from the deployed system for training, administrative or other purposes. These costs include transportation, lodging, mileage and per diam allowances and incidental travel expenses.

Cost Formula:

$$CRW = \sum_{I=1}^{Y} \sum_{J=1}^{K} PO(I,J) * RO(J)$$

where:

CRW = Operational Personnel (CREW) costs ($)

PO(I,J) = Number of operational personnel of grade J in year I. (S/GRADE/YR)

RO(J) = Unit pay and allowance of grade J personnel. ($/MAN)

I = Designator for a specific project year.
Y = Number of years in life cycle (YRS)
J = Designator for a spcific pay grade.
K = Number of different pay grades of operational personnel.

3.12 Operational Consumables Cost.

Definition:

This element refers to the material consumed in scheduled operations. It includes the cost of material, POL, expendable stores, and utilities.

Cost Formula:

$$OC = MAT + POL + ES + UT$$

where:
OC = Operational consumables cos. ($)
MAT = Material cost. ($)
POL = Petroleum, oil and Lubricants cost. ($)
ES = Expendable sotres cost. ($)
UT = Utilities cost. ($)

3.121 Material Cost

Definition:

This element refers to the material consumed in scheduled operations such as minor repairs. It includes the cost of consumables such as cleaning and painting, materials, nuts, and bolts.

Cost Formula:

$$MAT = \sum_{I=1}^{Y} N(I)*CMY$$

where:

MAT = Material costs. ($)

N(I) = Number of weapons systems in the inventory in year I. (systems)

CMY = Cost of material consumed per system per year. ($/system/yr)

I = Designator for a specific project year

Y = Number of years in life cycle. (YRS)

3.122 Petroleum, Oil and Lubricants (POL)

Definition:

This element refers to the petroleum, oil and lubricating products consumed in scheduled operation of the system.

Cost Formula:

$$POL = \sum_{I=1}^{Y} N(I)*POLY$$

where:

POL = Petroleum, Oil and Lubricants Costs

N(I) = Number of weapons systems in the inventory in year I (Systems)

POLY = Cost of POL consumed per system per year. (S/system/yr)

I = Designator for a specific project year.

Y = Number of years in life cycle (YRS)

3.123 Expendable Stores Costs

Definition:

This element refers to the cost of the expendable ordance, ammunition, pyrotechnics, missiles, and guided weapons used in system operations.

Cost Formula:

$$ES = \sum_{I=1}^{Y} N(I)\&EXPY$$

where:

ES = Expendable stores cost. ($)

N(I) = Number of weapons systems in the inventory in year I. (systems)

EXPY = Cost of expendable stores per system ($/System/YR)

3.124 Utilities Cost

Definition:

This element refers to the service cost of light power or water consumed in scheduled operations. It includes the cost of the equipment needed to provide the utility service.

Cost Formula:

$$UT = \sum_{I=1}^{Y} N(I)*UTIY$$

where:

UT = Utilities cost. ($)

N(I) = Number of weapon systems in the inventory in year I. (systems)

UTIY = Utilities cost per system per year. ($/system/YR)

3.2 Support Cost

Definition:

Support cost refers to all costs associated with the maintenance and logistics support of the system during the system's operational life. It includes the cost of both contractor and government support.

Cost Formula:

SUP = CS + GS

where:

SUP = Support cost. ($)

CS = Contractor support cost. ($)

GS = Government support cost ($)

3.21 Contractor Support Cost

Definition:

This element refers to the cost of integrated logistics support performed by the contractor during some specified time after delivery of the hardware.

Cost Formula:

CS = FR + FRF + FRO + TS

where:

CS = Contractor support costs. ($)

FR = Factory repair cost. ($)

FRF = Factory FIW/FFW cost. ($)

FRO = Factory rework/overhaul cost. ($)

TS = Tehcnical service cost. ($)

3.211 Factory Repair Cost

Definition:

This element refers to the cost of repairing a failed unit at the contractor's factory. It includes the cost of labor, materials and equipment needed to restore the unit to serviceable condition.

Cost Formula:

$$FR = \sum_{I=1}^{Y} \sum_{L=1}^{M} N(I)*OT*FRC(L)/R(I,L)$$

where:

FR = Factory repair costs. ($)

N(I) = Number of weapon systems in the inventory in year I. (Systems)

OT = Operating time of the system. (HRS/System/YR)

FRC(L) = Factory repair cost for equipment L. ($/Failure)

R(I,L) = MTBF for equipment L in year I (HRS/Faioure)

I = Designator for a specific project year.
Y = Number of years in life cycle. (YRS)
L = Designator for a specific factory repair item.
M = Number of equipments in inventory submjected to factory repair.

2.12 Peculiar Support Equipment Cost

Definition:

This element refers to the costs for Organizational level, Intermediate level, Prime Intermediate Maintenance Activity level, and depot level support and test equipments, including costs for design, material, fabrication, tooling, and unit test for all the items. Also included are the materials and services involved with the installation of the support and test equipments.

The support and test equipment refers to the equipment, including tools, required to maintain and care for the system or portions of the system while not directly engaged in the performance of its mission, and which have application peculiar to a given defense material item. This includes, vehicles, equipment, and tools used to service, transport and hosit, repair, overhaul, assemble, disassemble, test, inspect, or otherwise maintain the mission equipment.

Cost Formula:

$$PSE = \sum_{I=1}^{Y} PSE(I)$$

where:

PSE = Acquisition peculiar support equipmnet cost. ($)
PSE(I) = Expenditures during year I for acquiring peculiar support equipment. ($/YR)
I = Designator for a specific project year.
Y = Number of years in life cycle. (YRS).

3.213 Factory Rework/Overhaul Cost

Definition:

This element refers to the cost of performing depot level rework and overhaul Maintenance functions at the contractors factory. It includes the cost of labor, materials, spares and test equipment required to restore the unit serviceable condition.

Cost Formula:

$$FRO = \sum_{I=1}^{Y} \sum_{Q=1}^{S} N(I)*OT*ROH(Q)/MTBO(Q)$$

FRO= Factory rework/overhaul costs. (S)

N(I) = Number of weapon systems in the inventory in year I. (systems)

OT = Operating time of the system. (HRS/system/YR)

ROH(Q) = Facotry rework/overhaul cost for equipment Q. (/Rework)

I = Designator for a specific project year.
Y = Number of years in life cycle.(YRS)
Q = Designator for a specific rework/overhaul item.
S = Number of equipments in system subjected to contractor rework/overhaul.

3.214 Technical Services Cost

Definition:

This element consists of engineering and support services provided by the contractor during the system's operational life.

Cost Formula:

$$TS = \sum_{I=1}^{Y} TECY(I)$$

where:

TS = Technical services costs. ($)
TECY(I) = Government payments for technical services in year I. ($/YR)
I = Designator for a specific project year.
Y = Number of years in life cycle. (YRS)

3.22 Government Support Cost

Definition:

This element refers the cost of integrated logistics support performed by the governemnt during the systems operating life.

Cost Formula:

GS = MP + SSE + ST + UM + MF + SS + DRO + TR + TER

where:

GS = Government support costs. ($)
MP = Maintenance personnel cost. ($)
SSE = Support of support equipment cost. ($)
ST = Support training cost. ($)
UM = Updates and modifications cost. ($)
MF = Maintenance facilities cost. ($)
SS = Supply support cost. ($)
DRO = Depot rework/overhaul cost. ($)
TR = Transportation cost. ($)
TER = Termination cost. ($)

3.221 Maintenance Personnel Cost

Definition:

This element refers to the cost of personnel needed for system maintenance and repair. It includes the cost of maintenance personnel at all operating and repair sites; base, imtermediate level shop, and depot.

Cost Formula:

$$MP = \sum_{I=1}^{Y} \sum_{T=1}^{U} NMP(I,T) * MS(T)$$

where:

MP = Maintenance personnel costs. (S)

NMP(I,T) = Number of personnel of grade T maintaining system in year I. (MEN/GRADE/YR)

MS(T) = Unit pay and allowance of grade T personnel. (S/MAN)

I = Designator for a specific project year.
Y = Number of years in lifey cycle. (URS)
T = Desingator for a specific pay scale.
U = Number of different pay grades of personnel maintaining the system.

3.222 Support of Support Equipment Cost

Definition:

This element includes the cost, including labor, material, and overhead, to maintain the support equipment located at the operating base, intermediate level shop, and depot.

Cost Formula:

$$SSE = \sum_{I=1}^{Y} \sum_{V=1}^{W} NSE(I,V)*CSE(V)*SSF$$

where:

SSE = Support of support equipment costs.($)
NSE(,V) = Number of support equipments of type V in year I. (EQUIP/YR)

CSE(V) = Cost of type V support equipment. (S/Equipment)

SSF = Support of support equipment factor. (RATIO)

I = Designator for a specific project year.
Y = Number of years in life cycle. (YRS)
V = Designator for a specific type of support equipment.
W = Number of different types of support equipments.

3.223 Support Training Cost

Definition:

This element accounts for the cost of replacement training of operating and maintenance personnel. It includes the replacement cost of training equipment and the services cost associated with training personnel to replace those lost through attrition.

Cost Formula:

$$ST = \sum_{I=L}^{Y} TRTE(I) + RTRS(I)$$

where:

ST = Support training costs. ($)

RTRE(I) = Government expenditures for replacement training equipment. ($?YR)

RTRS(I) = Government expenditure for training services for replacement personnel. ($/YR)

I = Designator for a specific project year.
Y = Number of years in life cycle. (YRS)

3.224 Updates and Modifications Cost

Definition:

This element refers to the cost of labor and acquisition of special material for deterations or modifications of the system subsequent to equipment turnover to the government.

Cost Formula:

UM = DU + SU + SSM

where:

UM = Updates and Modifications costs. ($)
DU = Documentation update cost. ($)
SU = Software update cost. ($)
SSM = System/sub-system modification cost. ($)

3.2241 Documentation Updates

Definition:

This element refers to those costs associated with maintaining system technical orders (organizational, intermediate and depot level) to ensure that they reflect revise policies, concepts and data.

Cost Formula:

$$DU = \sum_{I=1}^{Y} DOUP(I)$$

where:

DU = Documentation update costs. ($)
DOUP(I) = Government expenditures for updating Documentation ($/YR)
I = Designator for a specific project year.
Y = Number of years in life cycle (YRS)

3.2242 Software Updates

Definition:

Software updates cost refers to the cost of correcting and modifying the system software package.

Cost Formula:

$$SU = \sum_{I=1}^{Y} STUP(I)$$

where:

SU = Software update costs. ($)
STUP(I) = Goverment expenditures for updating Software. ($/YR)
I = Designator for a specific project year.
Y = Number of years in life cycle. (YRS)

3.2243 System/Subsystem Modifications

Definition:

This element refers to the cost of the acquisition of hardware to alter or modify the system and support equipment that are in the operating inventory.

Cost Formula:

$$SSM = \sum_{I=1}^{Y} \sum_{X=1}^{Z} N(I)*NEQ(X)*HRD(X)*MODF(I,X)$$

where:

N(I) = Number of weapon systems in the inventory. (SYSTEMS)
NEQ(X) = Number of equipments type X in the system. (EQUIP/SYSTEM)
HRD(X) = Average hardware cost per equipment X. ($/EQUIPMENT)
MODF(I,X) = ECP Cost. (RATIO)
I = Designator for a specific project year
Y = Number of years in life cycle. (YRS)
X = Designator for specific piece of equipment.
Z = Number of equipments in the system.

3.225 Maintenance Facilities

Definition:

This element refers to the variable costs of construction, maintenance and operation of maintenance facilities associated with the system.

Cost Formula:

$$MF = \sum_{I=1}^{Y} MFC(I)$$

where:

MF = Maintenance facilities. ($)
MFC(I) = Government expenditures for maintaining the maintenance facilities. (S/YR)
I = Designator for a specific project year.
Y = Number of years in the life cycle. (YRS)

3.226 Supply Support

Definition:

This element refers to the cost of procuring spares and repair parts and the cost associated with establishing and maintaining system assemblies and components in the inventory.

Cost Formula:

SS = RSRP + SMGMT

where:

SS = Supply support costs. ($)
RSRP = Replenishment spares and repair parts cost. ($)
SMGMT = Supply management cost. ($)

3.2261 Replenishment Spares and Repair Parts

Definition:

This element refers to the recurring cost of inventory (units, assemblies, subassemblies, parts, etc.) purchased to resupply the system stock requirement due to items being discarded or scrapped during the maintenance process.

Cost Formula:

$$RSRP = \sum_{I=1}^{Y} \sum_{X=1}^{Z} (N(I)*OT*ACST(X)*ADSC(X))/R(I,X)$$

where:

RSRP = Replenishment spares and repair parts costs. ($)
N(I) = Number of weapon system in the inventory. (SYSTEMS)
OT = Operating time of the system (HRS/SYSTEM/YR)
ACST(X) = Average cost of discarded item in equipment X. ($/SCRAP ACTI(
ADSC(X) = Average scrap rate of items in equipment X. (SCRAP ACTIONS/ FAILURE)
R(I,X) = MTBF for equipment X. (HRS./FAILURE)
I = Designator for a specific project year.
Y = Number of years in life cycle. (YRS)
X = Designator for a specific piece of equipment.
Z = Number of equipments in the system.

3.2262 Supply Management

Definition:

This element refers to the cost of manpower and material needed to fill requisitions for supplies, spares and repair parts. It includes the of managing the procurement of supplies, spares and repair parts and control and accountability of these assets.

Cost Formula:

$$SMGMT = \sum_{I=1}^{Y} (NSNS*NMFS(I)+NSNP*NMFP(I))*FSA+(NSNP+NSNS)*RIM$$

where:

NSNS = Number of NSN's introduced by support systems. (NSN's)
NMFS(I) = Number of support system maintenance facilities. (SITES)
NSNP = Number of NSN's introduced by system. (NSN's)
NMFP(I) = Number of maintenance facilities. (SITES)
FSA = Field supply administration cost of the NSN. ($/NSN/SITE/YR)
RIM = Average NSN retention cost in supply system. ($/NSN/YR)
I = Designator for a specific project year.
Y = Number of years in the life cycle. (YRS)

3.227 Depot Rework/Overhaul

Definition:

This element refers to the cost of labor and materials needed to accomplish scheduled equipment rework or overhaul at the depot.

Cost Forumla:

$$DRO = \sum_{I=1}^{Y} \sum_{A=1}^{B} (N(I) * T*GOH(A))/MTGO(A)$$

where:

DRO = Depot rework/overhaul costs. ($)
N(I) = Number of weapon systems in the inventory. (SYSTEMS)
OT = Operating time of the system. (HRS/SYSTEM/YR)
GOH(A) = Depot rework/overhaul cost for equipment A. ($/REWORK)
MTGO(A) = Mean time between depot rework/overhaul of equipment A. (HRS/REWORK)
I = Designator for a specific project year.
Y = Number of years in the life cycle. (YRS)
A = Desingator for a specific piece of equipment.
B = Number of equipments in the system subject to rework/overhaul.

3.228 Transportation

Definition:

This cost element includes unscheduled and scheduled transportation costs between organizational and maintenance and supply locations in support of system maintenance.

Cost Formula:

TR = TU + TSCH

where:

TR = Transportation costs for operation & support. ($)
TU = Unscheduled transportation cost. ($)
TSCH = Scheduled transportation cost. ($)

3.2281 Transportation Unscheduled

Definition:

This element refers to the cost of transporting failed items from I-level shops to depot for repairs and back to the I-level inventory.

Cost Formula:

$$TU = \sum_{I=1}^{Y} \sum_{X=1}^{Z} (N(I)*OT*ABCM(X))*(ATRN(X)+ALBR(X)+AMAT(X)))/R(I,X)$$

where:

TU = Unscheduled transportation costs. ($)
N(I) = Number of weapon systems in the inventory. (SYSTEMS)
OT = Operating time of the system. (HRS/SYSTEM/YR)
ABCM(X) = Average BCM rate of item in equipment X. (BCM's/FAILURE)
ATRN(X) = Average 2-way shipping cost from I to D-level for failed items in equipment X. ($/BCM)
ALBR(X) = Average 2-way packaging labor cost from I to D-level for failed items in equipment X. ($/BCM)
AMAT(X) = Average packaging material cost from I to D-level for failed items in equipment X. ($/BCM)
R(I,X) = MTBF for equipment X. (HRS/FAILURE)
I = Designator for a sepcific project year.
Y = Number of years in the life cycle.
X = Designator for a specific piece of equipment.
Z = Number of equipments in the system.

3.2282 Transportation Scheduled

Definition:

This element refers to the cost of transporting equipment between I-level shops and depot for scheduled rework or overhaul.

Cost Formula:

$$TSCH = \sum_{I=1}^{Y} \sum_{A=1}^{B} ((ATNS(A)+ALR(A)+AMTR(A))*OT*N(I))/MTGO(A)$$

where:

TSCH = Scheduled transportation costs. ($)
ATNS(A) = Average 2-way shipping cost from I to D-level for rework items in equipment X. ($/REWORK)
ALR(A) = Average 2-way packaging labor cost from I to D-level for rework items in equipment X. ($/REWORK)
AMTR(A) = Average packaging material cost from I to D-level for rework items in equipment X. ($/REWORK)
OT = Operating time of the system. (HRS/SYSTEM/YR)
N(I) = Number of weapon systems in the inventory. (SYSTEMS)
MTGO(A) = Mean time between depot rework/overhaul of equipment A. (HRS/REWORK)
I = Designator for a specific project year.
Y = Number of years in the life cycle. (YRS)
A = Designator for a specific piece of equipment.
B = Number of equipments in the system subject of rework/overhaul.

3.229 Termination

Definition:

This element refers to the cost of phasing out the system at the end of its life cycle.

Cost Formula:

$$TER = \sum_{I=1}^{Y} NPO(I)*TERM$$

where:

TER = Termination costs. ($)
NPO(I) = Number of systems phased out during year I. (SYSTEMS/YR)
TERM = System terminal cost/value. ($/SYSTEM)
I = Designator for a specific project year.
Y = Number of years in the life cycle.

APPENDIX F

ERROR MESSAGES AND DATA DEBUGGING

F.1 Syntax Error Introduction

Syntax errors in the input data can occur for a variety of reasons. Fortunately FLEX can locate the great majority of serious errors and stop program execution before excessive computer time and money is wasted. When this happens, a sometimes cryptic error message is printed. It is the purpose of this appendix to identify these errors and to give the most likely cause (or causes) for these messages to be printed. It should be noted here that more than one error message can be printed for a single error.

F.2 Errors In The IDENT File

(1) END OF DATA ON UNIT 2 ENCOUNTERED

FLEX does not check this file for syntax errors so no program messages will be generated. However system errors may occur such as above. This error usually occurs if an insufficient amount of 'ENDID' cards are present for a multi-run set. The program is usually stopped by the system on this error.

F.3 Errors In The Data File

(2) *****ERROR ENCOUNTERED READING FILE 5. RUN TERMINATING*****
<card image>

This is a general error message printed when the system has difficulty reading the DATA file. This is usualy due to DCB parameters or file omission. The program is stopped without further checking.

(3) <card image>
SSUNRECOGNIZABLE CARD TYPE AA; IGNORED

The card type 'AA' is not 'RM' or 'CN'. Check the card image printed above the message. The program continues but the card is ignored.

(4) ERROR IN THE FOLLOWING CARD IN SUBROUTINE RDINTF
ICOL1=NNNNN ICOL2=NNNNN
<card image>

(5) ERROR IN THE FOLLOWING CARD IN SUBROUTINE RDINTF
IBL1=NNN IBL2=NNN
<card image>

(6) ILLEGAL CHARACTER IN COLUMN NNNNN OF THE FOLLOWING CARD

<card image>
(7) ERROR IN THE FOLLOWING CARD. ILLEGAL CHARACTER FOUND IN COLUMN NNNN
<card image>
(8) ERROR IN THE FOLLOWING CARD IN NDCTRL
<card image>

Errors (4) - (8) are due to a CN card syntax error. Check the card image that is printed below each message. If the column is given, check to be sure that the right number is in the right column. The program is stopped.

(9) <card image>
SS DUPLICATE PROGRAM CONTROL CARD; IGNORED

The program has found a duplicate CN card. This error sometimes occurs because the CN card is not placed at the beginning of the DATA file. Check the card image above this message. The program is continued but the card is ignored.

(10) BECAUSE OF SERIOUS NAMELIST INPUT ERROR, RUN WILL BE ABNORMALLY TERMINATED WITHOUT FURTHER INPUT CHECKING

This is usually caused by misspelling one of the variable names, leaving out a comma, or mistyping an equal sign. Remember to start all input in column 2. Check the DATA file input listing. The program is stopped without further checking.

(11) VALUE OF AAAAAA WAS NOT INPUT. PROGRAM STOP
(12) FIRST OR LAST ELEMENT OF AAAAAAA WAS NOT INPUT. PROGRAM STOP

These two errors are usually caused by forgetting to input, or incorrectly inputting, the scalar variables BI, NOCAT, or Y; and the array variables DR, IRRD, IRPROC, IRCON, or IRUM in the NAMELIST section. The program is stopped.

(13) END OF DATA ON UNIT 5 ENCOUNTERED

This is a system error usually caused by an insufficient number of 'ENDLC' cards in a multi-run set. The program is usually stopped.

F.4 Errors In the DSUFL/NV Files

(14) ATTEMPT TO INPUT MORE THAN 501 MODIFICATION NV-OS CARDS
FIRST UNACCEPTABLE CARD WAS:
<card image>
(15) <card image>
ATTEMPT TO INPUT OVER 113 SCALARS. LAST ACCEPTABLE SCALAR WAS AAAAAAAA
(16) <card image>

ATTEMPT TO INPUT OVER 100 ARRAYS, LAST ACCEPTABLE ARRAY WAS AAAAAAAA

(17) <card image>
ATTEMPT TO INPUT OVER 8002 ARRAY ELEMENTS, LAST ACCEPTABLE ARRAY WAS AAAAAAAA

These errors (14-17) all involve exceeding the the set program limits. To input more variables, a programmer must change the limits by making modifications to the actual FLEX program. The program continues but excessive cards are ignored.

(18) <card image>
DUPLICATE SCALAR NAME AAAAAAAA, ALL VALUES AFTER THE FIRST IGNORED

(19) <card image>
DUPLICATE ARRAY NAME AAAAAAAA, ALL VALUES AFTER THE FIRST IGNORED

A duplicate NV card has been found for each of the above error messages. In the first case a scalar, the second an array. The error is usually caused because of a misspelling or a card out of order and the user should check the card image printed above the message. Processing continues but the card is ignored.

(20) <card image>
NO RIGHT PARENTHESIS TO ENCLOSE ARRAY DIMENSION

This error usually occurs only because the right parenthesis is forgotten or mistyped. Check the card image printed above the message. Processing continues but the card is ignored.

(21) <card image>
INVALID CHARACTER A IN COLUMN NNN

This error is usually caused by a mistype in the numeric field of the NV card (possibly an alphabetic character). Check the card image printed above the message, 'A' is the character and 'NNN' is the column number. Processing continues but the card is ignored.

(22) <card image>
INVALID DIMENSION ON ABOVE CARD; DIMENSION MUST BE AN INTEGER CONSTANT OR A SCALAR VARIABLE

This error is usually caused by either omitting the scalar NV card that defines the dimension or by a mistyped character. Check the characters in the parenthesis of the card image printed above the error message. Processing continues but the card is ignored.

(23) <card image>

BLANK FIELD SHOULD HAVE CONTAINED A NUMBER

Usually this error results from a blank repetition factor. Check the card image printed above the message. Processing continues but the card is ignored.

(24) <card image>
CODE IN FIRST 2 COLUMNS IS NOT NV

This error is most often caused by a mistyped character or a card out of order. Check the first two columns of the card image printed above the message. Processing continues but the card is ignored.

(25) <card image>
FAILED TO INPUT ALL ELEMENTS OF ARRAY AAAAAAAA

This error most often occurs when more than one NV card is needed to define an array variable. Check the card image for the omission of a comma on the card. If this is the case, this error will appear with error (16). If error (16) does not follow, it is possible that the number of numerical values is incorrect. Check the NV file input listing for this. The dimension may also be incorrect or mistyped. Processing continues but the card is ignored.

(26) <card image>
DIMENSION OF ARRAY AAAAAAAA IS NNN, MUST BE AT LEAST 1

This error is usually caused by a mistyped subscript or failure to input a value for 'Y'. Check the card image printed above the message for the correct dimension. Processing continues but the card is ignored.

(27) <card image>
TWO STARS IN ONE FIELD OF A CARD NOT ALLOWED; SECOND STAR WAS IN COLUMN NNN

This error is caused by more than one repetition factor star in one field. Check the card image for a mistype in column 'NNN' or the omission of a comma. Processing continues but the card is ignored.

(28) <card image>
ATTEMPT TO INPUT TOO MANY ELEMENTS INTO ARRAY AAAAAAAA, SPECIFIED DIMENSION WAS NNNN

This error is usually caused by accidentally inserting a comma after the last numerical value input to an array on an NV card. Check the NV input data listing for the correct number of commas and values. Check the dimension subscript and look for mistyped

repetition factors. If everything appears in order, check the card image to assure that the array name matches 'AAAAAAAA'. Processing continues but the card is ignored.

F.5 Errors in the CSDFL/CS File

(29) ILLEGAL CARD TYPE AA ON THE FOLLOWING CARD:
<card image>
MAKECS WILL TREAT IT AS AN EQ CARD

This error is caused because the first two characters of the card are not 'CS' or 'EQ' and instead are 'AA'. It is usually caused by a mistyped character or a spurious card in the CSDFL or CS file. Check the first two columns of the card image printed in the error message. FLEX assumes it is an EQ card and processing continues. If it is not an EQ card, more errors will be generated.

(30) THE FOLLOWING CARD IN DEFAULT CS FILE IS OUT OF SEQUENCE:
<card image>
STRUCTURE NUMBERS MUST BE IN ORDER, AND EQ CARDS MUST IMMEDIATELY FOLLOW THEIR CORRESPONDING CS CARD
PROGRAM STOP

This error is usually caused by mistyping the CSS number. Check the card image for mistyped characters in columns 2-7. If none are found, check the CSDFL input data listing for the preceding card and for cards out of sequence. The program is stopped but checking continues.

(31) MORE THAN LIMIT OF 1000 CARDS IN MODIFICATION CS FILE
FIRST UNACCEPTABLE CARD WAS <card image>
PROGRAM STOP
(32) ATTEMPT TO INPUT MORE THAN 1110 EQUATION ELEMENTS
FIRST UNACCEPTABLE EQUATION RELATED TO THE FOLLOWING COST:
<card image>
PROGRAm STOP
(33) ATTEMPT TO INPUT MORE THAN 111 COSTS
FIRST UNACCEPTABLE COST WAS:
<card image>
PROGRAM STOP

Errors (31-33) are caused by attempting to exceed the practical limits. If more inputs are necessary a programmer should change the internal dimensions of the FLEX program. The program is stopped.

(34) MISSING DEFAULT CS CARD OR CS-EQ SEQUENCE ERROR FOR STRUCTURE NUMBER NNNNNN PROBLEM CARDS ARE <card image>
<card image>
PROGRAM STOP

(35) THE FOLLOWING CARD SHOULD HAVE BEEN A CS CARD
<card image>
PROGRAM STOP

These errors are usually caused by a card out of sequence or the omission of the equation code in column 70 of the previous card. Check the card images displayed and the CSDFL input data listing. The program is stopped but input checking continues.

(36) THE FOLLOWING EQUATION ENDS WITH AN ARRAY ELEMENT, WHICH SHOULD NEVER HAPPEN
<card image>
PROGRAM STOP

This usually happens when a comma is omitted from the EQ card. Check the card image displayed for commas and mistyped characters. If it is correct, check the CSDFL input data listing for cards out of sequence. The program is stopped but input checking continues.

(37) THE FOLLOWING CARD SHOULD HAVE BEEN AN EQ CARD
<card image>
PROGRAM STOP

This error is usually caused by accidentally inserting a '1' in column 70 of the previous card or ending an EQ set with a comma. Check the CSDFL input data listing for these errors and for cards out of sequence. The program is stopped but input checking continues.

(38) EQ NUMBER ON THE FOLLOWING CARD DOES NOT MATCH CS NUMBER OF PREVIOUS CARD. PROGRAM STOP
<card image>

This error is usually caused by a card out of sequence or a mistyped character in either the card displayed or the previous one. It could also be caused by inserting an equation code or '1' in column 70 of the previous card. Check the card image printed with the message and the CSDFL input data listing. The program is stopped but input checking continues.

(39) STRUCTURE NUMBER NNNNNN IS INVALID. NO NUMBER MAY HAVE A NONZERO DIGIT FOLLOWING A ZERO
PROGRAM STOP

This error is usually caused by the CBS number of the CS or EQ card being mistyped. Check the CSDFL input data listing for the number 'NNNNNN'. The program is stopped but input checking continues.

(40) STRUCTURE NUMBER NNNNNN REQUIRES THE EXISTENCE OF THE HIGHER

INDENTURE NUMBER IIIIII WHICH IS NOT PRESENT
STRUCTURE IS INVALID
PROGRAM STOP

This error is usually caused by omitting the required number 'IIIIII' or mistyping it. This error could also be caused by mistyping the number 'NNNNNN'. Check the CSDFL input data listing for these errors and check other flagged errors which may relate to number 'IIIIII'. The program is stopped but input checking continues.

(41) COST CATEGORY, FUNDING TYPE, OR INFLATION CATAGORY WAS INPUT FOR NONPRIMARY STRUCTURE COST NNNNNN
NONPRIMARY COSTS DO NOT REQUIRE THIS INFORMATION.
PROGRAM STOP

(42) AN EQUATION WAS INPUT FOR NONPRIMARY STRUCTURE COST NNNNNN.
NONPRIMARY COST DO NOT HAVE EQUATIONS.
PROGRAM STOP

These errors are usually caused by the user making modifications to the CSDFL or CS files by adding sublevel CAS line elements and forgetting to remove the higher level cost codes or cost equations. Check the CSDFL or CS input data listing for these errors or errors in sequencing. The program is stopped but input checking continues.

(43) COST CATEGORY CCC FOR COST NUMBER ###### IS INVALID;
MUST BE BETWEEN 1 AND NOCAT=AAA
PROGRAM STOP

(44) FUNDING TYPE FFF FOR COST NUMBER ###### IS INVALID;
MUST BE BETWEEN 1 AND 6
PROGRAM STOP

(45) INFLATION CATEGORY III FOR COST NUMBER ###### IS INVALID;
MUST BE BETWEEN 1 AND 4
PROGRAM STOP

Errors (43-45) are usually caused by mistyped characters or omitted characters (if CCC, FFF, or III equal 0) in the cost code columns. Check the CSDFL or CS file for these errors. The program is stopped but input checking is continued.

(46) NO EQUATION WAS INPUT FOR PRIMARY COST ######
PRIMARY COSTS MUST HAVE EQUATIONS.
PROGRAM STOP

This error is usually due to omitted or out-of-sequence Eq cards. Check the CSDFL or CS file input listing for the card following the CS card with number '######'. The program is stopped but input checking is continued.

(47) INVALID EQUATION ELEMENT AAAAAAAA IN POSITION NN

OF THE FOLLOWING EQUATION:
<card image>

This error is usually the result of either omitting the NV card that defines 'AAAAAAAA' or having that NV card ignored because of a previous error. Check the NV input data listing and the NV error messages. The program is stopped but input checking continues.

(48) INVALID OR MISSING SUBSCRIPT AAAAAAAA IN POSITION NN OF THE FOLLOWING EQUATION:
<card image>

This error is usually the result of not specifying the index parameter of the summation or by choosing an non-integer parameter. Check the CSDFL input data file listing for the specific EQ card(s) and check the summation parameters and subscript AAAAAAAA for misspelling or omission. The program is stopped but input checking continues.

F.6 Errors in The SA File

(49) ARRAY AAAAAAAA HAS NNNN ROWS. USER HAS ATTEMPTED TO SENSITIZE THE **********TH ROW. CARD IGNORED
(50) ARRAY AAAAAAAA HAS NNNN COLUMNS. USER HAS ATTEMPTED TO SENSITIZE THE **********TH COLUMN. CARD IGNORED

These errors are usually caused by mistyped characters in the SA file. Check the SA input data listing and the NV file for parameter errors. Program continues but the card is ignored.

F.7 Errors In the 'RUNS=' Field Of The JCL Cards

(51) RUN TERMINATING DUE TO INVALID CHARACTER IN POSITION NN OF RUNS FIELD AA ON EXEC CARD IN JCL
(52) RUNS FIELD ON JCL EXEC CARD IS NNNNNNNNNN
MAXIMUM ALLOWABLE VALUE IS 99. PROGRAM STOP

Both of these errors are caused by an error on the JCL cards, specifically in the FLEX execution card 'RUNS=' field. Check the JCL listing at the beginning of the program. The program is stopped after input data is checked.

APPENDIX G

ADDENDA: COGNIZANT OFFICE OUTPUT REPORTS

page 3-3

CS CARD FORMAT
11-49 Cost Element Description
50-51 Number of this cost element's Cognizant Office (order determined by COGNAM input)
52-54 Unused

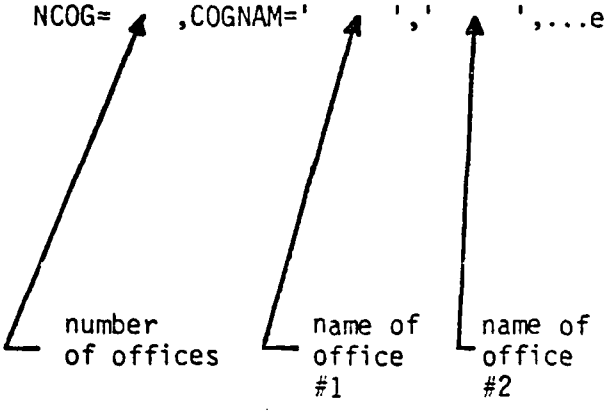
page 3-11

CN CARD FORMAT
21-24 Unused
25-30 Cognizant Office Output Reports (6 different options)
25 Summary by CO (cognizant office)
26 Funding by CO
27 Annual Cost by Funding by CO
28 Annual Cost by Funding by cost category
29 Annual Cost by cost category by CO
30 Annual Cost by CO
31-80 Unused

page 3-11

The Cognizant Office identification card is entered as a NAMELIST INPUT CARD. There can be 25 offices of 8 characters each.

Format: NCOG= ,COGNAM=' ',' ',...etc.,



APPENDIX H

LCC FLX 9ETAPE LOADING INSTRUCTIONS

COMPUTER MAGNETIC TAPE FILE PROPERTIES

01 Completion Date (Year / Month / Day)	02. Form Prepared By (Name and Phone)	03. File ID Number (Property Control No.)
8 / 2 / 0 5 / 0 7	Richard Dress 202-433-3021	
04. Recording Date (Year / Month / Day)	**05. File Identifier or Descriptive Title**	**06. Short Title (External Label Name)**
8 / 2 / 0 1 / 0 2	LCC FLEX-9E (NMAT LCC Model)	LCC FLEX
07. Source Unavailable (Year / Month / Day)	**08. Documentation Available (Enter Citation)** — Yes: X; No:	NTIS Accession No. User's Guide for NMAT LCC FLEX Model
		09. File Position on Reel: 1 of

10. To Be Returned	11. Submitting Organization & Address	12. Receiving Organization & Address
Yes: ; No: X — To Other Than The Sender	Naval Weapons Engineering Support Activity Washington Navy Yard Washington D.C. 20374	Federal Software Exchange Center 5285 Port Royal Road Springfield, VA 22161
13. Due Back Date (Year / Month / Day)		

14. Technical Contact(s) & Phone Number(s)

See #02

RECORDING SYSTEM CHARACTERISTICS

		17. No. of Tracks			18. Parity		19. Density (BPI)
		7	9	Other	Odd	Even	
EQUIPMENT MANUFACTURER AND MODEL	15. Processing Unit: IBM 360, 370, or 3033						
	16. Tape Subsystem: IBM 2400		X		X		1600
RECORDING SOFTWARE	20. Operating System, Release & Version: OS						
	21. Utility Program or Data Base Language: DBL						
	22. Internal File Identifier: ESA. LCC. RUSSELL. WBS100. LCCFLX9E						

23. Characters Set (Graphics)	☐ ASCII	☐ BCD	☐ Other (Specify)	
	☒ EBCDIC	☐ FIELDATA	☐ Non-Print Codes	
24. Recorded Label (Internal Label)	☒ Header	☐ ANSI X 3.27 Standard	☐ Other	
	☒ Trailer	☐ FIPS Standard	☐ None	

FILE CHARACTERISTICS

NUMBER OF RECORDS	25. Physical: 171	27. Record Type: ☒ Fixed Length; ☐ Other Than Fixed	28. Records/Block (Blocking Factor): 40	TYPE OF FILE ORGANIZATION (Check One Box): ☐ One File One Reel; ☐ One File Multiple Reels; ☒ Multiple Files One Reel; ☐ Multiple Files Multiple Reels
	26. Logical: 8000			
RECORD LENGTH	30. Physical: 3200	☒ Bytes ☐ Chars. ☐ Words (Bits/Word)		
	31. Logical: 80	☒ Bytes ☐ Chars. ☐ Words (Bits/Word)		

SUPPLEMENTAL INFORMATION

32. Use/Handling Constraints (Specify if Yes)

Yes	No
	X

33. For Submitting Organization Use: The FLEX-9E life cycle cost computer model is a user-oriented methodology accommodating most cost structures and their associated equations. It's extreme flexibility allows tailoring to meet requirements of DoD Directives 5000.1, 5000.4, and 5000.28. Also, this methodology bas been identified by OMB as having demonstrated successful operation. This program contains two sample cost structures with equations (one for major weapon systems and one for equipment). These cost structures may be used as-is, modified, or replaced by the user's cost structure. Presented as batch processing, this program can be run from a terminal or modified to run interactively.

INSTRUCTIONS FOR USE OF THE LCCFLX9E LIFE CYCLE COST TAPE

I. QUICKLOAD INSTRUCTIONS

This tape is 9 track 1600 BPI (DEN=3) with standard labels. To quickly load and test the LCCFLX9E program load files (05,SL) and (07,SL) both using IEBCOPY.

(05,SL) ESA.LCC.RUSSELL.WBS100.LM.LCCFLX9E
(07,SL) ESA.LCC.RUSSELL.F9EQPDAT

Then punch the PROC LCCFLX9E which is on file (06,SL) using IEBGENER.

(06,SL) ESA.LCC.RUSSELL.PROC9E

Note: this has a PEND card as the last card in the deck for use as an inline PROC.

You can now run the sample Equipment Model problem (Appendix D in the green Equipment Model User's Guide) with a runstream similar to the following:

```
//JOB CARD
//PROC CARDS
//PEND
//EXEC LCCFLX9E,
//DATAPDS='ESA.LCC.RUSSELL.F9EQPDAT'
//
//
```

If you want to test the Cognizant Office Report Options punch file (09,SL) using (IEBGENER). This is a rundeck.

(09,SL) ESA.LCC.RUSSELL.TST9ECOG

II. GENERALIZED LOADING INSTRUCTIONS

This tape contains 15 files.

(01,SL) ESA.LCC.RUSSELL.SEQ.WBS100.LCCFLX9E
Sequential - Unloaded with IEBGENER
This is the Source Master File. The numbers 109,111,113,1001,03001,0030 are unique and are only used for dimensions. Changing dimensions to accommodate specialized problems can be done by using a text editor to change these numbers and then by compiling and linkediting.

(02,SL) ESA.LCC.RUSSELL.DATEOBJ
Sequential - Unloaded with IEBGENER
This is an object deck for subroutine DATE on IBM systems.

'3,SL) ESA.LCC.RUSSELL.LKEDOVLY
.ouential - Unloaded with IEBGENER
This is the Linkage Editor Overlay Structure

(04,SL) ESA.LCC.RUSSELL.COMPILE.WBS100.LCCFLX9E
Sequential - Unloaded with IEBGENER
This is a compilation listing
To print this file use IEBGENER with the DCB for SUSUT2 given by:
DCB=(RECFM=FBA,LRECL=120,BLKSIZE=3480)

(05,SL) ESA.LCC.RUSSELL.WBS100.LM.LCCFLX9E
PDS - Unloaded with IEBCOPY
This is the load module

(06,SL) ESA.LCC.RUSSELL.PROC9E
Sequential - Unloaded with IEBGENER
This is an inline PROC. If you put this in PROCLIB be sure to remove the PEND card at the end of the PROC.

(07,SL) ESA.LCC.RUSSELL.F9EQPDAT
PDS - Unloaded with IEBCOPY
This is test data for the Equipment Model
To execute this sample data, use a runstream similar to:

```
//LCCFLX9E  JOB
//  EXEC LCCFLX9E,
//  DATAPDS='ESA.LCC.RUSSELL.F9EQPDAT'
//
//
```

(08,SL) ESA.LCC.RUSSELL.F9WEPDAT
PDS - Unloaded with IEBCOPY
This is test data for the Weapons System Model. To execute this sample data, use a runstream similar to:

```
//LCCFLX9E  JOB
//  EXEC LCCFLX9E,
//  DATAPDS='ESA.LCC.RUSSELL.F9WEPDAT'
//
//
```

(09,SL) ESA.LCC.RUSSELL.TST9ECOG
Sequential - Unloaded with IEBGENER
This is a run stream for testing the Cognizant Office Report Option

(10,SL) ESA.LCC.RUSSELL.SEQ.WBS200.LCCFLX9E
Sequential - Unloaded with IEBGENER
This is a source dataset capable of using 200 Work Breakdown Structure elements.

(11,SL) ESA.LCC.RUSSELL.WBS200.LM.LCCFLX9E
PDS - Unloaded with IEBCOPY
This is the load module for 200 Work Breakdown Structure elements.

(12,SL) ESA.LCC.RUSSELL.SEQ.WBS300.LCCFLX9E
Sequential - Unloaded with IEBGENER
This is a source capable of using 300 Work Breakdown Structure elements.

(13,SL) ESA.LCC.RUSSELL.WBS300.LM.LCCFLX9E
PDS - Unloaded with IEBCOPY
This is the load module for 300 Work Breakdown Structural Elements

(14,SL) ESA.LCC.RUSSELL.SEQ.WBS30050.LCCFLX9E
Sequential - Unloaded with IEBGENER
This is a source capable of using 300 Work Breakdown Structure Elements and storing results over a 50 year life cycle.

(15,SL) ESA.LCC.RUSSELL.WBS30050.LM.LCCFLX9E
PDS - Unloaded with IEBCOPY
This is the load module for 300 Work Breakdown Structure elements with a 50 interval ~~year~~ life cycle.

III. NOTES

1) The operators which can be used with user - written equations are:

   a) Binary +,-,*,/,**,MAX,MIN
   b) Unary +,-,INT,LOG10,LOGE

2) The construction of user - written equations must be in Reverse Polish notation. This is the same as when using a Hewlett Packard calculator. The Hewlett Packard instruction manual is applicable to construction of user - written equations with their ENTER corresponding to our COMMA.

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. DOD/DF-82/007a	2.	3. Recipient's Accession No.

4. Title and Subtitle
User's Guide for Naval Material Command's Life Cycle Cost (FLEX) Model

5. Report Date Prep. 4/82
6.

7. Author(s)
R. Dress (ESA) & T. Struven (Hughes Aircraft Co.)

8. Performing Organization Rept. No. NMAT/LCC-FLEX9E

9. Performing Organization Name and Address
Naval Weapons Engineering Support Activity
Washington Navy Yard
Washington D.C. 20374

10. Project/Task/Work Unit No. MAT/ESA/31L

11. Contract(C) or Grant(G) No.
(C) N/A
(G)

12. Sponsoring Organization Name and Address
Naval Material Command (MAT-023)
Washington D.C. 20360

13. Type of Report & Period Covered INTERIM

14.

15. Supplementary Notes
This methodology has been successfully operated on the following data processing equipment: IBM 360, IBM 370, IBM 3033, IBM 4341, VAX 11-780, PDP 1140, B 6800, MV 8000, UNIVAC, and WANG For magnetic tape see:

16. Abstract (Limit: 200 words)
The FLEX-9E life cycle cost computer model is a user-oriented methodology accommodating most cost structures and their associated equations. It's extreme flexibility allows tailoring to meet requirements of DoD Directives 5000.1, 5000.4, and 5000.28. Also, this methodology has been identified by OMB as having demonstrated successful operation and is directed for use within the Naval Material Command by NAVMAT ltr. 0422/DC, 16 Feb 77.

This program contains two sample cost structures with equations (one for major weapon systems and one for equipment). These cost structures may be used as-is, modified, or replaced by the user's cost structure. Consequently, the FLEX methodology can be easily adapted to meet the LCC requirements of other services and agencies. Presented as batch processing, this program can be run from a terminal or modified to run interactively.

17. Document Analysis a. Descriptors

Life Cycle Cost	Design to Cost
Life Cycle Cost Analysis	Design to Life Cycle Cost
Life Cycle Costing	LCC
Economic Analysis	DTC

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement:	19. Security Class (This Report)	21. No. of Pages
Unlimited	UNCLASSIFIED	258
	20. Security Class (This Page) UNCLASSIFIED	22. Price


FILMED
7-8